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**Alternative indexes for monitoring customer perceptions of service quality:  
A comparative evaluation in a retail context**

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**ABSTRACT:** In 2 independent studies, the relative validity of various indexes that can be used to summarize consumers' service quality ratings are examined. In Study I, using typical commercial survey data from a fast-food/convenience retail chain, both the mean and top-box percentiles are found to be the best indicators of service quality, based on their correlation with customer-driven business performance measures. In Study II, the results are further confirmed by an extensive simulation that varies factors such as the shape of the underlying distribution of customer ratings and the strength of the relationship between customer ratings and business performance measures.

**TEXT:** Headnote:

Customer satisfaction and service quality measures obtained through consumer surveys invariably have skewed distributions. As such, researchers have questioned the appropriateness of the popular approach of using the mean rating to summarize such data. However, no detailed study on this topic has yet been conducted. In two independent studies, the relative validity of the various indexes that can be used to summarize consumers' service quality ratings (e.g., mean, median, mode, kurtosis, skewness, top/bottom-tail percentiles) are examined. In Study 1, using typical commercial survey data from a fast-food/ convenience retail chain, both the mean and top-box percentiles are found to be the best indicators of service quality, based on their correlation with customer-driven business performance measures. In Study 2, the results are further confirmed by an extensive simulation that varies factors such as the shape of the underlying distribution of customer ratings and the strength of the relationship between customer ratings and business performance measures. The article concludes with a discussion of the findings and implications for future **research**.

Measures of customer satisfaction and service quality obtained through **consumer** surveys have become a widely used barometer of business performance over the past decade. For example, Gale (1994) reported that AT&T has found that changes in measures of customer-perceived quality cause changes in market share. This caused the company to shift its performance management emphasis from profit and loss statements to measures of marketperceived quality and relative value as early indicators of future financial results. The AT&T example underscores that companies measure service quality and customer satisfaction because they believe these metrics are indicators of other critical measures of business performance such as customer loyalty, profit, market share, and growth (Anderson, Fornell, and Lehmann 1994; Bolton and Drew 1991; Buzzell and Gale 1987; Fornell and Wernerfelt 1987; Rust and Zahorik 1993). This logic goes back to Drucker's (1954) view that a company's most important asset is its customers and if they are satisfied, the company will prosper.

The importance placed on service quality and customer satisfaction surveys has gone so far that some companies base employee incentives and performance appraisals on these metrics (Hauser, Simester, and Wernerfelt 1994). While this trend is a positive move toward market-driven management,

the noticeable disconnection between academic research and industry practice concerning the measurement of service quality and customer satisfaction raises some questions about the validity of existing approaches.

Two relatively important areas where practice has lagged research are (1) defining and operationalizing service quality and customer satisfaction and (2) determining the best indexes to describe service quality and customer satisfaction data. Regarding the definition and operationalization of service quality and customer satisfaction, research has suggested that service quality and customer satisfaction are distinct constructs (Oliver 1997; Taylor and Baker 1994) and that there is a causal relationship between the two (Cronin and Taylor 1992; Gotlieb, Grewal, and Brown 1994; Spreng and Mackoy 1996). Unfortunately, an examination of the measurement work in industry suggests that this distinction is often ignored in practice (Naumann and Giel 1995; Zeithaml, Berry, and Parasuraman 1996).

More important, researchers have questioned the adequacy of commonly used indexes (e.g., mean scores) used to report customer satisfaction and service quality survey results. Peterson and Wilson (1992) suggest that the majority of service quality and customer satisfaction surveys in practice tend to result in consumer responses that are highly skewed. As a result, an average rating based on the arithmetic mean of the consumer responses is likely to be a poor measure of a central tendency and may not be the best indicator of service quality or satisfaction. Moreover, the skewness of consumer ratings is likely to bias correlations between consumer responses and objective measures of business performance, resulting in unreliable interpretation of data.

If measurement efforts in industry are failing to properly operationalize service quality and customer satisfaction and are using inappropriate statistics to describe the resulting data, such initiatives in the name of marketdriven management may be doing more harm than good.

This article addresses the disconnection between research and practice concerning both the operationalization of service quality and customer satisfaction and the appropriateness of various indexes to describe the distribution of service quality and customer satisfaction data. The primary emphasis in this article is on examining some of Peterson and Wilson's (1992) conclusions concerning the use of various indexes of service quality and customer satisfaction in a retail context. Some of the issues concerning operationalizing service quality, customer satisfaction, and understanding their relationship to performance are reviewed to clarify areas where there have been disconnections between research and practice. Moreover, issues related to operationalization are reviewed to locate the measurement approach used in the empirical portion of this article in the context of the extant literature. Specifically, in Study 1, using a large consumer sample, the relationship between various indexes of store-level service quality ratings (e.g., mean, median, mode, kurtosis, skewness, top/bottom-tail percentiles) and objective measures of business performance are explored. This examination should be considered exploratory since researchers have noted that the link between service quality and business performance is complex and a number of potential interceding variables may be operating (Oliver 1997; Zeithaml et al. 1996). The article concludes with a discussion of the findings and implications for future research.

#### MEASUREMENT ISSUES IN SERVICE QUALITY AND CUSTOMER SATISFACTION

There is a vast literature concerning service quality and customer satisfaction. Two areas of this literature will be reviewed here: (1) operationalizing service quality and customer satisfaction constructs and (2) the measurement implications of commonly encountered skewed distributions in service quality and customer satisfaction data. The literature concerning operationalization is reviewed to provide a context for the instrument and data that are used to examine the skewness issue. As

such, this review will summarize work in this area rather than present an exhaustive discussion. More extensive examination of these issues can be found in other works (Iacobucci, Grayson, and Ostrom 1994; Oliver 1993, 1997).

#### Operationalizing Service Quality and Customer Satisfaction

A number of researchers have made the point that the purpose of measuring service quality and customer satisfaction is to provide information to enhance customer loyalty and improve overall financial performance of the firm (Oliver 1997; Rust, Zahorik, and Keiningham 1994).

As such, the first step in establishing a reliable customer measurement system is to define service quality and customer satisfaction and to link these constructs to objective measures of performance. In terms of the link with measures of business performance, researchers have established a relationship between customer perceptions of quality and satisfaction and profit (Anderson et al. 1994; Buzzell and Gale 1987; Fornell and Wernerfelt 1987), customer defection and retention rates (Bolton and Drew 1991; Zeithaml et al. 1996), and market share (Rust and Zahorik 1993).

While the association with business performance has been established, researchers and practitioners have been less successful in defining and distinguishing service quality and customer satisfaction. Researchers have pointed out that service quality and customer satisfaction have not been consistently defined and differentiated in the marketing literature and have even been used interchangeably (Iacobucci et al. 1994; Oliver 1997; Parasuraman, Zeithaml, and Berry 1994a; Taylor and Baker 1994). Both constructs are, at the most general level, evaluation or appraisal variables that relate to consumers' judgments about a product or service (Iacobucci et al. 1994; Oliver 1997).

Oliver (1997) summarized the differences between these constructs by indicating that (1) service quality judgments are evaluations of specific cues or attributes, whereas satisfaction judgments are more global; (2) expectations for service quality are based on "excellence" perceptions, whereas satisfaction judgments include referents such as need and equity; and (3) service quality judgments are more cognitive, whereas satisfaction judgments are more affective and emotional reactions. Often these subtle but important differences between service quality and customer satisfaction are ignored in practice (Parasuraman et al. 1994b).

The dominant models of service quality (Parasuraman et al. 1988, 1994a) and customer satisfaction (Oliver 1997; Spreng, MacKenzie, and Olshavsky 1996) operationalize these constructs as a gap or disconfirmation between perceived performance and some expectation-based referent (needs, wants, desires, or expectations). However, researchers in service quality (Cronin and Taylor 1992; Parasuraman et al. 1994a; Zeithaml et al. 1996) and customer satisfaction (Churchill and Surprenant 1982; Cronin and Taylor 1992; Woodruff, Cadotte, and Jenkins 1983) have noted that there are instances where perceived performance has been shown to be a good predictor of purchase intentions. In practice, both disconfirmation and perceived performance approaches tend to be used (Naumann and Giel 1995, p. 136; Oliver 1997, pp. 33, 120).

Research on the causal relationship between service quality, customer satisfaction, and performance has been hampered by a failure to make clear whether measures of service quality and customer satisfaction are at the encounter-specific or global (summary judgment based on multiple transactions) level. For encounter-specific quality, Oliver (1997) indicated that there is a strong quality-affects-satisfaction relationship, and that for global quality and satisfaction, there is a strong satisfaction-affects-quality relationship as overall satisfaction judgments influence attitude about service quality. Parasuraman et al. (1994b) address these issues directly and develop models of both transaction

(encounter) and global consumer evaluations. In their models they distinguish between present and past transactions. In both models (transaction and global), perceptions of transaction service quality influence perceptions of transaction satisfaction, which, in turn, influence perceptions of global (overall considering all transactions) service quality and satisfaction.

Thus, the dominant view in the literature is that satisfaction is a superordinate construct and that perceptions of service quality affect feelings of satisfaction, which, in turn, influence future purchase behavior (Anderson and Sullivan 1993; Anderson et al. 1994; Cronin and Taylor 1992; Gotlieb et al. 1994; Spreng and Mackoy 1996; Taylor and Baker 1994). Notwithstanding this, it should be noted that there is some evidence that service quality and satisfaction act jointly (e.g., interaction effects) in their effects on purchase intentions (Taylor 1997; Taylor and Baker 1994), that service quality can have a direct effect on customer retention and business performance (Zahorik and Rust 1992; Zeithaml et al. 1996), and that the causality question concerning service quality and customer satisfaction remains unresolved (Iacobucci et al. 1994).

#### Indicators Used for Summarizing Consumers' Responses

While it seems clear from the research that service quality and customer satisfaction have an effect on business performance, certain psychometric properties of service quality and customer satisfaction measures call into question the validity of existing approaches for reporting these data. It has been widely noted that measures of service quality and customer satisfaction in practice tend to be negatively skewed; that is, they are neither symmetric nor normally distributed, and the majority of respondents express their responses using the upper (most positive) portion of the response scale (Estelami and DeMaeyer 1997; Parasuraman et al. 1994a; Peterson and Wilson 1992; Westbrook 1980). Even deliberate efforts to design instruments to achieve a more normal distribution have resulted in little success (Westbrook 1980).

Peterson and Wilson (1992) examined this issue extensively from a conceptual standpoint and drew a number of conclusions and implications. On the basis of their observations in a large number of industry studies, the authors concluded the following:

1. Virtually all service quality and customer satisfaction ratings obtained through consumer surveys are negatively skewed and not normally distributed. This suggests that commonly used statistical indicators that assume a normal distribution may be inappropriate indexes for summarizing such data.
2. Measures of average ratings based on the arithmetic mean of the consumer responses are meaningless because the skewness of the distribution makes the mean an inappropriate measure of central tendency of the distribution of ratings.
3. Skewed distribution of consumer ratings may underestimate or attenuate the correlation between consumer ratings and other related variables such as profitability, sales, and market share.

Peterson and Wilson (1992) question both the validity and usefulness of using mean scores and percentage topbox scores to report consumer satisfaction and service quality survey results. This is disturbing since such approaches are common practice in industry. The remainder of the article focuses on examining Peterson and Wilson's (1992) conclusions in the context of a typical service quality and customer satisfaction measurement effort that was conducted in a retail organization. The instrument used in the study is described and tied to the extant literature. An attempt is then made to determine which indexes of service



quality most correlate with service-quality-related performance measures. The results of two studies are presented to explore the relative performance of the various indexes of customer ratings of service quality in retail store surveys. In Study 1, using customer survey data from a fast-food/convenience store chain, we examine the validity of aggregate store-level measures of service quality based on their correlation with objective measures of firm performance (changes in sales and customer counts). In Study 2, we further examine the results in a simulation that varies factors such as the shape of the underlying distribution of customer ratings of service quality and the strength of the relationship between service quality and overall performance of the retail outlet.

#### STUDY 1: EMPIRICAL RESULTS FROM A CHAIN OF FAST-FOOD/ CONVENIENCE STORES

##### Research Method Sample

The authors were able to obtain the agreement of a chain of fast-food/convenience stores that operated in the United States to participate in the study. There were over 100 stores in the chain, and store locations sold grocery items, beverages, and fast food. The chain had hired a market research firm to conduct store-by-store customer surveys as part of their strategy of measuring and improving service quality at each location. The authors were given access to the data and to personnel from the client and research firm who had been involved in the study.

A large number of customers were interviewed at each store since the company's goal was to achieve a reliable store-by-store measure of service quality for continuous improvement and store manager evaluation purposes. Customer intercept interviews were conducted by personnel trained and employed by the outside research firm. Customers were selected at random for interviews at the stores during all shifts throughout the day. In total, about 47,000 customers were interviewed with the mean sample size being 288 per store. Table 1 presents descriptive statistics for the sample. The sample had a balanced coverage of the three shifts, respondent ages, and was slightly more represented by men than women. The sample demographics matched the company's target profile well. Since the performance data would be examined over a 2-year period, stores that were not open in both years were excluded from the sample as well as stores that had large changes in customer count or net sales due to store remodeling or significant changes to the store offerings in either year.

This reduced the sample to 129 stores from an initial sample of 141 stores.

##### Questionnaire Development and Data Collection

In developing the questionnaire, focus groups were conducted with customers and store employees to determine what attributes of the retail offer were important to customers. In addition, the attributes identified in the focus groups were confirmed by examining prior empirical work that had been conducted by the company and by the industry association concerning attributes of fastfood/convenience stores that were important to consumers.

As noted by Oliver (1997, p. 49), focus groups supplemented by some empirical validation is a reasonable basis for identifying performance dimensions for measurement. Questions were developed by personnel from the external market research company to measure customers' ratings of the attributes identified.

Customers were approached at the store location, were screened for prior usage, and were asked to "please rate this store based on your typical experiences with it." The interviewer then asked them to rate the store attributes such as "cleanliness of the sidewalk area," "employee friendliness," and "speed of service." For ratings of the specific attributes of the store, customers were asked to respond using a 5-point

rating scale (5 = excellent, 4 = very good, 3 = good, 2 = fair, 1 = poor). If, for whatever reason, the customer was not familiar with a particular aspect of the service, he or she was able to respond with a "do not know" response. Across the sample and all survey items, only 9.6 percent of the responses were "do not know" responses, in which case the mean rating of that item in that store was substituted. All respondents were screened for prior shopping experience, and only 11 percent of the respondents considered themselves infrequent (one visit in the last 2 weeks) shoppers at the store, as gauged by a separate survey item.

Sixteen attributes of the stores were rated by respondents. Table 2 outlines the questions asked and the results of the factor analysis, using an orthogonal transformation.

As can be seen, the 16 items load on three clearly interpretable facets of the stores' service quality: cleanliness of the **facility** (Factor 1), food quality (Factor 2), and employee responsiveness (Factor 3). These three factors in combination account for over 65 percent of variation in customer responses. The factors that emerged correspond to some of those found by Dabholkar, Thorpe, and Rentz (1996) in measuring retail service quality. In addition to the service quality measures, as part of the survey process, the company also included an overall satisfaction question. The single-item satisfaction measure gauges customers' reactions by asking them to indicate on a 5-point scale (very dissatisfied to very satisfied), "Overall, with all things considered, how satisfied are you with your visits to this store?"

Since the interest in this study was establishing the best indicator of service quality and relating it to objective measures of performance, a multi-item service quality scale was developed by combining the 16 single-item questions. The single-item satisfaction scale was not the primary focus because multi-item scales are typically more reliable. The use of a multi-item scale is not only consistent with prior work on customer satisfaction and service quality (e.g., Oliver 1981; Zeithaml, Parasuraman, and Berry 1990) but is also appropriate because of the numerous advantages gained by using a multi-item measurement scale. The resulting service quality scale therefore ranged in value from a low of 16 (all 16 items rated a 1) to a high of 80 (all 16 items rated a 5), taking on 65 different values.

To assess the content validity of the scale, the coefficient alpha was computed. The coefficient alpha for the scale was .92, indicating a high level of internal reliability. The correlation between the multi-item service quality measure and the single-item overall satisfaction measure was computed at both the individual level ( $r = .57$ ,  $p < 0.001$ ) and at the aggregate store level ( $r = .81$ ,  $p < .001$ ).

Given the objective of examining issues from the literature in the context of a fairly "typical" commercial study, it was necessary to establish that the measurement approach used by this organization of rating aspects of service quality from excellent to poor was similar to that used by other companies. To establish this, the authors examined a number of customer satisfaction and service quality surveys. The following companies used survey designs that were similar to the one used in this study: Disney Hotels, Toyota Motor Sales USA, Federal Express, American Airlines, and McDonald's. Also, two books that were representative of recent industry practice were reviewed and the measurement approach taken in this study was found to be consistent with practices reported (AMA 1996; Naumann and Giel 1995). Further evidence that the measurement approach was representative came from the fact that the research firm had done many studies using the same measurement approach for other companies.

Locating the Measurement Approach in the Context of the Extant Literature

Confirming Zeithaml et al.'s (1996) suggestion that there has been some confusion of these terms, while the company referred to the survey as "customer satisfaction" measurement, this instrument, in fact, emphasizes service quality measurement. Only one item measured customer satisfaction. This is consistent with Oliver's (1997) view that service quality measurement focuses on specific dimensions, is primarily cognitive, and uses standards of excellence as a comparison point. To some degree, the performance measure used in this instrument is similar to Parasuraman et al.'s (1994b) three-column format for SERVQUAL, where performance is assessed by asking consumers to rate service dimensions on a scale from 1 (low) to 9 (high). It is also similar with the performancebased approach used in Zeithaml et al. (1996), where customers rated overall service quality from 1 (poor) to 9 (good).

The instrument used in this study did not explicitly include an expectations-based comparison standard; that is, consumers were not asked about their expectations, needs, or desires concerning the attributes measured, and quality and satisfaction were not operationalized in terms of the gap between performance and expectations. As such, this instrument is a performance-based rather than a disconfirmation measure. The approach used was a global measure (summary judgments) of service quality and customer satisfaction since customers were asked to think about their "typical experiences with this store."

(Table Omitted)

Captioned as: TABLE 1

(Table Omitted)

Captioned as: TABLE 2

In the context of the extant literature, the instrument should be considered a somewhat limited performancebased measure of service quality. It is limited because there was no overall measure of service quality and a disconfirmation-of-expectations approach was not used. Furthermore, the failure to properly distinguish service quality and customer satisfaction from a conceptual standpoint and include multiple items to measure satisfaction was a limitation. As noted in the literature review, these weaknesses are often found in industry measurement efforts, and the construct validity and practical utility of the service quality measure largely depend on whether it correlates with nonsurvey measures of store performance that it should theoretically be related to. This question of nomological validity relates to the degree to which a construct behaves the way it should when examined in the context of related constructs (Cronbach and Meehl 1955; Fornell, Johnson, Anderson, Cha, and Brynna 1996; Johnson, Anderson, and Fornell 1995); that is, if the higher levels of service quality as measured in this study did not correlate positively with changes in sales and customer count, it would suggest that the service quality measure lacks construct validity. Therefore, a positive correlation would suggest that even with these limitations, the service quality measure has construct validity as well as practical utility. This question is addressed in the next section of the article.

Alternative Service Quality Indexes Prior work (e.g., Peterson and Wilson 1992) has identified various indexes that could be used as metrics for measuring customer ratings of service quality and customer satisfaction. Commonly used measures are the mean rating and percentile distribution of the response measure at the tails (top or bottom boxes) of the scale (e.g., "75% of respondents rated the store a 10 or higher") (Gale 1994; Naumann and Giel 1995). The authors expanded on this list and computed a comprehensive set of measures that could be used to describe the distribution. The question of interest was to identify the measure that was the most reliable indicator of firm performance. The list of measures tested was as follows: Mean: For each store, the average rating by all

respondents in that store was used.

Mode: Represents the most frequently expressed response for each store.

Median: For each store, the frequency midpoint on the multi-item scale was obtained.

Kurtosis: Represents an index for the height of the peak on the scale's distribution.

Skewness: Represents an index for the degree of asymmetry around the mean rating.

Top x%: This measure represents the proportion of respondents who indicated a response in the top x percent boxes on the 16-to-80 response scale. For example, "Top 50%" refers to the percentage of respondents who rated the store as a 48 (midpoint of the response scale) or above. Similarly, "Top 25%" refers to the percentage of respondents who rated the store a 64 (top 25 % of the response scale) or higher.

Bottom x%: Similar to the Top x index, this measure represents the proportion of respondents who were in the bottom x percent of the response scale.

#### Service-Quality-Related Performance Measures

Because service quality has to do with psychological perceptions, measurement requires devising a means to assess perceptions through surveys or interviews. As noted by Churchill (1979), there are two criteria for establishing the validity of such measures: (1) content validity that is established by showing that the items make sense, have face validity, and are internally consistent as measured by coefficient alpha; and (2) construct validity that is established by showing that the measure correlates with other measures of the same or similar constructs and does not correlate with constructs that are dissimilar. Peter and Churchill (1986) further argue that "empirical evidence of relationships between measures of conceptually related constructs is commonly accepted as evidence of the validity of both the measures and the theory in which the construct is embedded" (p. 1). Landy (1986) and Hogan and Nicholson (1988) made the point more strongly by suggesting that all validity ultimately concerns construct validity, which is established through hypothesis testing; that is, showing that a measured construct is significantly related to another construct with which it should theoretically be related. In the context of service quality measurement it is important to establish that the items make sense, seem to be measuring service quality, and are internally consistent. However, the most critical aspect of validity concerns whether the measured construct relates to nonsurvey criterion variables that should theoretically be related to the construct. As Peterson and Wilson (1992) point out, if such measures are not related to customer behavior and objective measures of performance, such as market share, sales and customer transactions, then they are questionable in terms of both construct validity and practical utility.

In a retail context it is possible to identify non-surveyrelated criterion variables that should theoretically be correlated with store measures of service quality. Researchers have suggested that service quality and customer satisfaction are best conceptualized and measured as latent constructs in a system of equations that predicts customer loyalty or some objective performance measure (Anderson et al.1994; Anderson and Sullivan 1993; Bolton and Drew 1991; Fornell and Wernerfelt 1987; Johnson 1995; Rust and Zahorik 1993). As such, in a retail context, we would expect that all other things being equal (i.e., product offering, marketing spending, etc.), stores with higher levels of service quality would be more likely to maintain or increase their level of sales revenue and customer traffic than

stores with lower levels of service quality. This method of establishing validity is consistent with other approaches that have been used in **consumer satisfaction research** (Fornell et al. 1996; Johnson et al. 1995).

This study used year-to-year changes in sales revenue and store customer counts as performance measures that should be related to service quality. For each store, the relative growth in customer count and sales from one year (1993) to the next (1994) was measured as percentage change. Customer count represented the average number of daily transactions registered at each store, while sales represent the average dollar value of the store's daily sales for a given year. Since the service quality surveys were administered during the second quarter of 1994, the combination of the service quality and store performance data allow for a 6-month lag in relating service quality (at time  $t$ ) and store performance (at time  $t + 1$ ). Rust et al. (1994, p. 90) provide support for the use of a 6-month lag between measuring quality perceptions and assessing the impact on business performance. They provide evidence that quality perceptions affect market share over a 2- to 8-month time frame and that most of the effects are seen in 6 months.

Both measures of store performance offer an ideal metric because most of the variables that would affect sales and customer counts were controlled in this study. Specifically, since the product mix and promotional strategies were centralized and common for all stores, and since store and district managers were responsible for the execution of chainwide programs, differential store marketing efforts to drive customer counts were not a factor. In addition, differential effects that were due to different competitive dynamics across stores were controlled for largely by only looking at changes in customer counts year to year. It is unlikely that the radical changes in local competitive dynamics would occur differentially among this sample in a 1-year time frame. Given that many of the factors that would affect sales and customer counts were controlled for in this setting, we would expect that stores that score higher in service quality would have higher rates of growth in sales and customer count. Thus, it was reasonable to hypothesize that there would be a significant positive correlation between service quality and these factors.

## Results

### Response Scale Distribution

Figure 1 shows the distribution of the measures obtained through the service quality scale. As observed by previous researchers (e.g., Estelami and DeMaeyer 1997; Peterson and Wilson 1992; Westbrook 1980), the customer responses seem to deviate from normality and are negatively skewed. To confirm this, a test of normality was conducted on each store's data by using the Shapiro-Wilk statistic. The Shapiro-Wilk tests the null hypothesis that the sample data are drawn from a normal distribution. The results of the test showed that the service quality scale has a significant deviation from normality at the  $p < .001$  level of significance. A similar test at the store level also confirmed that none of the 129 stores had service quality response measures that were normally distributed. This confirms Peterson and Wilson's (1992) observation that customer satisfaction and service quality data tend to be negatively skewed. Further analyses were conducted to determine the degree to which this presents a problem.

### Efficacy of Service Quality Indexes

To assess both the construct validity and practical utility of the various service quality indexes, correlation analysis was used to determine the extent to which each index was related to store-level performance. Across the 129 stores, the Pearson correlation coefficients between each service quality index (e.g., mean, median, top and bottom indexes, etc.) and the

relative growth in sales and customer count were computed. Table 3 summarizes these correlations.

As shown in Table 3, among the service quality indexes, the mean, median, mode, top-box, and bottom-box indexes are significantly correlated with relative sales growth (significance levels indicated by asterisks). Only the indexes based on skewness and kurtosis of the store's ratings are not significant. The relative efficacy of these indexes will be discussed later in this article. In terms of customer count growth, the mean, median, and the top-box indexes also show a significant relationship. However, two of the four bottom-box indexes, the mode, kurtosis, and skewness indexes of service quality are not related to growth in customer count. It should also be noted that the directionality of the results is consistent with expectations. The correlations between the "top" indexes and customer count growth, and sales growth are positive. This indicates that as the percentage of customers falling in the upper boxes of the 16- to 80-point response scale increases, customer patronage is also likely to increase. Moreover, the "bottom" indexes show the opposite sign, indicating that as more respondents fall in the lower ends of the response scale, customer patronage is likely to decrease.

The results suggest that these measures of service quality are valid indicators of service-quality-related business performance and that they have practical utility as benchmarks of store performance. The fairly low level of the correlations suggests that Peterson and Wilson (1992) were correct in their caution concerning error and attenuation in such measures. These results suggest that service quality measures of the type used in this study are useful; however, some may be better indicators of certain aspects of performance than others. To examine which indexes appear to be the best indicators, further analysis was done.

#### Relative Performance of Indexes

As noted earlier, Peterson and Wilson (1992) suggested that mean scores or average service quality ratings were not necessarily meaningful measures. They also proposed that since most people report that they are satisfied, global measures of service quality should be used to identify dissatisfaction (rather than satisfaction) and take the appropriate action. They suggested that concentrating on the lower tail of the distribution was the best approach. To examine these propositions, the magnitude of the correlations for the various indexes and the performance measures were examined. Using Cohen and Cohen's (1983) test for determining the significance of differences in correlations from one sample, the correlations in Table 3 were examined further. Tests were done to determine whether the correlations produced by the mean service quality ratings outperform the correlations from the remaining indexes. The results presented in Table 3 indicate that for relative sales growth, the mean, median, and top-box indexes tend to outperform others (significance levels indicated by letters). In terms of relative customer count growth, the only significant differences are for the mode and skewness indexes, which perform poorly compared to all others. As noted earlier, we focused on the multi-item service quality scale rather than the single-item satisfaction measure because multi-item scales tend to have higher reliability than single-item measures. It bears noting that correlation analysis using the single-item satisfaction measure yielded similar results. For relative sales growth, the mean satisfaction rating had a correlation of .37, which was close to the top box at .35. All the remaining satisfaction indexes resulted in lower correlations than the mean.

Moreover, top-box analysis produced higher correlations than bottom-box analysis. Parallel results were observed with respect to relative customer count growth.

(Graph Omitted)

Captioned as: FIGURE 1

(Table Omitted)

Captioned as: TABLE 3

These results indicate that, contrary to Peterson and Wilson's (1992) suggestion, the mean and the top-box indexes of service quality are better indicators than the bottom-box indexes, which appear to be weaker measures.

To reexamine and further validate the above findings, a simulation was conducted.

## STUDY 2: REPLICATION OF FINDINGS USING A SIMULATION

### Research Method

The objective of the simulation was to identify the conditions under which the various distributional indicators of service quality would perform well as predictors of related shopping behavior. Factors such as the shape of the underlying distribution of consumers' service quality ratings and the strength of the link between service quality and shopping behavior were varied systematically, and the relative performance of the various indexes was observed.

Because empirical results from Study 1 as well as prior research indicated that the service quality measures are not normally distributed, a more flexible distribution function was needed to simulate the distribution of customer ratings. The normal distribution is always symmetric and therefore is unable to reflect asymmetries where the data are loaded on one end of the response scale. To overcome the above problems, a bounded and flexible distribution function-the beta distribution-was used. The beta distribution function is defined by (Formula Omitted)

(Formula Omitted)

3. The size of the error term. In addition to the above two factors, the amount of error in the link between service quality and shopping behavior was varied at the individual level through the error term  $e$  in the previous equation. The error term was drawn from a normal distribution with a mean of 0, but the standard deviation of the error term was varied at three levels: low (0.1), moderate (0.5), and high (1.0). The error term was introduced to reflect unobservable factors that may create noise in the service quality data (e.g., competitive promotions, changing consumer habits, etc.).

There are a total of 27 possible cells resulting from the crossing of the above factors (3 Distributions x 3 Link Strengths x 3 Error Levels). For each of these cells, data were generated for 100 hypothetical stores, each with 100 hypothetical respondents. Therefore, each hypothetical respondent's service quality assessment was drawn from a distribution to which it was assigned. Moreover, depending on the strength of the link between service quality and shopping behavior ( $b$ ), and size of the error term ( $e$ ) to which the respondent was assigned, the corresponding levels of  $b$  and  $e$  were applied to Equation 2 in determining the respondent's shopping behavior. Once 100 hypothetical respondents were simulated for each store, the aggregated behavioral effect on the store was determined by summing the individual respondents' behavior measures.

### Results

Similar to Study 1, for each of the 27 cells of the simulation, the correlation between the various distribution measures outlined in Study 1 (e.g., mean, median, and mode of the respondent ratings), and aggregated

storelevel customer shopping behavior was computed. Tables 4 and 5 summarize the results by providing the marginal means of the correlation measures.

Both tables reveal patterns similar to the one observed in Study 1. For example, Table 4, which outlines the effects of variations in the link between service quality and shopping behavior, indicates that the bottom-box indicators negatively correlate with aggregated store-level shopping behavior, while the top boxes are positively correlated.

Measures such as the mode, kurtosis, and skewness provide relatively poor indicators of service quality, as was observed in Study 1. Also, under the variety of distribution shapes simulated, the mean typically outperforms most of the remaining measures. Moreover, top-box indexes systematically yield higher correlations than bottom-box indexes. The superior performance of the mean, however, fades away as the link between service quality and shopping behavior becomes weaker, in which case most measures of service quality perform equally poorly. Interestingly, the above observations hold, even in cases of a severe skewness in the data, as represented by distribution C. This suggests that even if the data are far from being normally distributed, contrary to propositions made by previous researchers (e.g., Peterson and Wilson 1992), the mean service quality rating is not an inappropriate indicator of business performance measures affected by service quality. Moreover, the use of alternative measures (e.g., mode, median, etc.) seems to lack merit in the retail context simulated in this study.

Table 5 outlines the effects of noise in the link between service quality and shopping behavior in the **simulated retail environment**. Such noise could occur in real life because of factors such as competitive promotions, seasonal and geographic shifts in purchase behavior, or changing consumer habits. The table outlines the marginal means for the correlations in the various error-term conditions. The results in Table 5 also confirm the previous results. Specifically, under all three distribution forms, the mean service quality rating tends to outperform the remaining measures. As before, top-box analysis also yields higher correlations than bottom-box analysis. Moreover, as the size of the noise in the system increases, all measures drop in their relative performance. What is most interesting is that, similar to the previous findings, the mean service quality rating consistently outperforms the remaining measures—even under conditions of severe skewness in the data (e.g., distribution C).

The results of the simulation support using the mean as the key indicator of service quality, as was observed in Study 1. Moreover, the mean seems to be an appropriate indicator under significant deviations from normality. The relative superiority of the mean decreases as the link between service quality and shopping behavior becomes weaker or as the noise in the relationship increases. However, even under these conditions, no alternative index of service quality outperforms the mean.

## DISCUSSION

The empirical results of this article, based on actual and simulated service quality data, shed some light on the use of different types of indexes for monitoring service quality and customer satisfaction. First, the results from Study 1 confirm that service quality measures are negatively skewed; that is, the majority of respondents report that the service was good or excellent and a minority report that service was poor. This finding is consistent with other research that has shown similar skewness in customer satisfaction and service quality data even where deliberate attempts have been made to achieve a more normal distribution (Westbrook 1980). Second, contrary to the suggestions of Peterson and Wilson (1992), Studies 1 and 2 both showed that despite a skewed distribution, mean and topbox indexes are, in most conditions, the best



indicators. In the simulation, in the 18 correlations reported in Tables 4 and 5, the mean performs equal to, or better than, all the other indexes in all cases. In Study 1, the mean also performed well, being equal to, or better than, all the other indexes. These results suggest that the mean is the most robust index because it performs best across a variety of situations. While the mean was the best indicator in most scenarios, the top-box index was also a good indicator. In Study 1, the top-box indexes' performance was equal to the mean in four of the five top-box correlations with relative sales growth. The top-box indexes equaled the mean in correlation for all five correlations concerning customer count. In Study 2, the top-box measures' performance matched the mean in 15 out of the 18 scenarios simulated.

Perhaps the mean does so well in the majority of the cases because unless the data deviate drastically from normality, it is the most appropriate measure of central tendency. The mean has the lowest error variance of all possible indicators and is therefore a better indicator for the entire distribution. Other measures, such as the median, might be more appropriate in cases of severe deviations from normality. While service quality and customer satisfaction measures tend to be negatively skewed, because they typically use scale anchors with finite boundaries (e.g., ratings from 1 to 7), the magnitude of the skewness is limited. This would not be the case, for example, where the range in possible responses is greater, such as in measures of income where the range might be from 0 into the millions. In such cases, extreme values in the data could make the mean a poor indicator of central tendency of the distribution.

(Graph Omitted)

Captioned as: FIGURE 2

(Table Omitted)

Captioned as: TABLE 4

(Table Omitted)

Captioned as: TABLE 5

Top-box measures perform well because the distributions of service quality and customer satisfaction measures are typically negatively skewed and therefore most of the responses are in the upper portions of the scale. As such, top-box measures capture the majority of the responses and a great deal of the information about the distribution of responses. Other indexes may therefore not be as reliable as the top-box and the mean indexes. For example, the mode can be a very unstable measure, and especially in cases where the ratio of the number observations to the number of points in the response scale is low, as in ours, the mode "jumps around" a lot. The results of Studies 1 and 2 revealed that the mode generally showed weak correlations and performed poorer than indexes using the mean or top boxes. Indexes made up of the degree of kurtosis or skewness in the distribution also generally showed weak correlations with the objective measures of related business performance. With regard to the bottombox index, the results from both studies show that this index generally shows weaker correlations with business performance measures and performs poorer than the mean and top-box indexes.

The empirical results in this article should not obscure some practical considerations in determining the best index for monitoring service quality or customer satisfaction. The most important consideration is, Why are service quality or customer satisfaction data being collected? What is the purpose? The obvious answer is to improve service quality or customer satisfaction and thereby increase customer loyalty, word of mouth, and market share; however, this is not a thoughtful enough answer. There are a

variety of strategies that can be used to achieve these business objectives and the measurement program should be designed to support the chosen strategy. For example, American Express Financial Advisors chose the strategy of trying to maximize customer loyalty (Kaarre 1996). They conducted research that indicated that clients who rated the company's satisfaction scale in the top box were more likely to be retained, more likely to recommend the firm to a friend, and had a higher frequency of recommending the firm to others. This provided the company with a strong rationale for using top-box scores in reporting the results of their customer satisfaction surveys throughout the company. If a company was in a less competitive market, was at capacity in terms of its ability to serve customers, and where it was costly for customers to switch (inconvenience, time-consuming, etc.), it could be argued that a firm might want to choose a strategy of minimizing customer alienation. If a firm confirmed this relationship through **consumer research**, it may want to monitor customer dissatisfaction and allocate its resources to reduce incidents that lead to extremely poor customer perceptions. In such a scenario, the bottom-box reporting index may be most useful.

There has been a groundswell of activity in industry in the area of service quality and customer satisfaction measurement. This study points out that to some degree this groundswell has proceeded with action first and theory second. It is crucial that measurement efforts begin with greater clarity concerning the objective business performance indicators that the company is trying to influence and the customer behaviors that relate to them. The process involves developing a chain of logic and theory that relates business performance, customer behavior, quality and satisfaction, and finally identifies the internal business processes that affect service quality and satisfaction. Recent work by Hurley and Laitamaki (1995), Rust et al. (1994), and Zeithaml et al. (1996) provides some guidance about how to make these linkages. Using customer evaluations as early indicators of future financial performance is theoretically sound and quite promising; however, these metrics are more subject to error and less developed than their financial accounting predecessors.

#### LIMITATIONS AND FUTURE RESEARCH

This article did not address issues concerning whether there are different causal relationships depending on the use of encounter-specific or global-level measures of quality and satisfaction. Testing the model offered by Parasuraman et al. (1994a) would be a start. Also, this research used one commercial study as a context in which to review these issues. While this offers the benefit of specificity and focus, more work needs to be done to survey the field and report the frequency of different methods being used in practice. Such work might yield interesting and intriguing results. Additional research can also investigate the impact of variations in the service quality-shopping behavior relationship on the relative performance of the indexes examined here. For example, a similar simulation approach can be used to investigate nonlinearities and interactions in the relationship (Taylor 1997; Taylor and Baker 1994).

Finally, causal modeling of the relationships between service quality, customer satisfaction, customer behavior, and objective measures of business performance needs to be done in more contexts to determine whether situational factors affect the magnitude or direction of the relationships. If such studies were conducted, practitioners would have a stronger basis from which to select the appropriate variables and measures for benchmarking.

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Footnote:

NOTE

Footnote:

1. To test if in a single sample, variable X's correlation with variable Y is different from the correlation between X and some other variable V,

Footnote:

the following t-test with n-3 degrees of freedom is conducted (Cohen and Cohen, 1983, p. 57):

Reference:

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DESCRIPTORS: Studies; Statistical analysis; Customer services; Consumer attitudes; Quality of service  
CLASSIFICATION CODES: 9190 (CN=United States); 5320 (CN=Quality control); 7100 (CN=Market research); 9130 (CN=Experimental/Theoretical); 2400 (CN=Public relations)

...TEXT: performance measures. The article concludes with a discussion of the findings and implications for future **research**.

Measures of customer satisfaction and service quality obtained through **consumer** surveys have become a widely used barometer of business performance over the past decade. For... items load on three clearly interpretable facets of the stores' service quality: cleanliness of the **facility** (Factor 1), food quality (Factor 2), and employee responsiveness (Factor 3). These three factors in...This method of establishing validity is consistent with other approaches that have been used in **consumer** satisfaction **research** (Fornell et al. 1996; Johnson et al. 1995).

This study used year-to-year changes...the effects of noise in the link between service quality and shopping behavior in the **simulated** retail **environment**. Such noise could occur in real life because of factors such as competitive promotions, seasonal...to choose a strategy of minimizing customer alienation. If a firm confirmed this relationship through

**consumer research** , it may want to monitor customer dissatisfaction and allocate its resources to reduce incidents that...Drew. 1991. "A Multistage Model of Customers' Assessments of Service Quality and Value." **Journal of Consumer Research** 17 (March): 375-384.

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... his M.B.A. from McGill University and his Ph.D. from Columbia University. His **research** has been published in the **Journal of Consumer Satisfaction**, **Dissatisfaction and Complaining Behavior**, **Pricing Strategy and Practice**, **Middle East Insight**, **Advances in Consumer Research** , the **Journal of Professional Services Marketing**, and the **Journal of Business in Developing Nations**.

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**The influence of multiple store environment cues on perceived merchandise value and patronage intentions**

Baker, Julie; Parasuraman, A; Grewal, Dhruv; Voss, Glenn B  
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**ABSTRACT:** Research on how store environment cues influence consumers' store choice decision criteria, such as perceived merchandise value and shopping experience costs, is sparse. Especially absent is research on the simultaneous impact of multiple store environmental cues. The authors propose a comprehensive store choice model that includes: 1. three types of store environment cues as exogenous constructs, 2. various store choice criteria as mediating constructs, and 3. store patronage intentions as the endogenous construct. The authors conclude by discussing the results to develop an agenda for additional research and explore managerial implications.

**TEXT:** Research on how store environment cues influence consumers' store choice decision criteria, such as perceived merchandise value and shopping experience costs, is sparse. Especially absent is research on the simultaneous impact of multiple store environment cues. The authors propose a comprehensive store choice model that includes (1) three types of store environment cues (social, design, and ambient) as exogenous constructs, (2) various store choice criteria (including shopping experience costs that heretofore have not been included in store choice models) as mediating constructs, and (3) store patronage intentions as the endogenous construct. They then empirically examine the extent to which environmental cues influence consumers' assessments of a store on various store choice criteria and how those assessments, in turn, influence patronage intentions. The results of two different studies provide support for the model. The authors conclude by discussing the results to develop an agenda for additional research and explore managerial implications.

There was a time not so long ago that retail environments had few standards to meet. A store should be clean and organized to maximize sales per square foot. It should also be pretty .... Today, though, the retail environment must tie in directly to the brand, and, in fact, speak the brand's value proposition.

-Nancye Green

How does the retail environment tie in to customers' perceptions of the value of a store's merchandise? In a broader sense, in what way does the retail environment ultimately influence a customer's decision to patronize a particular store? There is a dearth of research-based answers to such questions, though conventional wisdom and the actions of many retailers suggest that store environment has a critical bearing on consumers' store choice processes. Scholarly verification of this. conventional wisdom and research-based insights for guiding the design of store environments are lacking. Prior store environment research has achieved the following:

-Demonstrated that various environmental elements, taken one at a time, affect consumer responses. Elements examined include music (e.g., Areni and Kim 1993; Hui, Dube, and Chebat 1997; Milliman 1982), color (e.g., Bellizzi, Crowley, and Hasty 1983), scent (Spangenberg, Crowley, and Henderson 1996), and crowding (e.g., Eroglu and Machleit 1990; Hui and Bateson 1991);

-Examined how general constructs such as "store atmosphere" (e.g., Donovan



and Rossiter 1982) or "physical attractiveness" of the store (e.g., Darden, Erdem, and Darden 1983) affect store patronage intentions; and -Produced evidence suggesting that store environments trigger affective reactions in customers (e.g., Babin and Darden 1996; Baker, Grewal, and Levy 1992; Donovan et al. 1994; Hui and Bateson 1991; Wakefield and Blodgett 1999).

However, store environment research to date has not examined key issues such as how different store environment cues together shape consumers' merchandise value perceptions and how those perceptions, in turn, influence store patronage intentions. The extant literature also lacks empirical research on the relative impact of key antecedents of perceived merchandise value. For example, shopping experience costs, which include consumers' time and effort in obtaining products, as well as the psychological cost of shopping (e.g., irritation caused by loud music or crowding), have been suggested as potential determinants of merchandise value (Zeithaml 1988) and store choice (Bender 1964). However, a comprehensive model incorporating these constructs has not been tested in a retailing context.

To address the aforementioned research voids, we first propose a conceptual framework that incorporates the effects of three distinct store environment dimensions: design, social, and ambient.<sup>1</sup> We then describe and report results from two studies, the first designed to test our conceptual framework empirically and the second designed to verify the robustness of the results. Drawing on findings from the two studies, we offer implications for marketers and propose avenues for further research.

#### Conceptual Framework

Our conceptual framework, shown in Figure 1, integrates theories from cognitive and environmental psychology with Zeithaml's (1988) proposal that value perceptions, which drive purchase decisions, are based on perceptions of product quality (what consumers get from an exchange) and price (the monetary and nonmonetary aspects of what consumers give up in an exchange). Figure 1 adapts the model proposed by Zeithaml (1988) to a retail setting and incorporates insights from Baker's (1998) and Bitner's (1992) conceptualizations of how the service environment can influence consumer decision making. The overall sequence of effects in our model is that store environmental dimensions influence consumers' perceptions of store choice criteria-- namely, interpersonal service quality, shopping experience costs, and merchandise value (mediated through perceived quality, price, and shopping experience costs)--and these perceptions, in turn, affect store patronage intentions. Consumer perceptions in our model refer to inferences about the levels of quality, price, and value that consumers would expect in a store on the basis of store environment cues. As such, the model is especially appropriate when potential customers have limited a priori knowledge about a store's specific offerings, as well as in contexts in which a store undergoes a major remodeling, thereby exposing customers to a new set of store environment cues.

#### FIGURE 1

Four unique aspects of our model differentiate our study from previous studies. First, we explicitly identify two types of shopping experience costs--time/effort and psychic-- and examine their influence on store patronage intentions. Our time/effort cost construct captures consumers' perceptions of the time and effort they are likely to expend shopping at a store. Economic pricing models acknowledge that time/effort costs influence consumers' perceptions of what they give up in an exchange (Becker 1965), and research anchored in Becker-based models (e.g., Marmorstein, Grewal, and Fishe 1992; Scharly 1971) suggests that time spent in stores looking or waiting for goods and services has an economic value to consumers.

The psychic cost construct represents consumers' mental stress or emotional labor during the shopping experience. Environmental psychologists (e.g., Mehrabian and Russell 1974) have focused on understanding these costs,

which we view as consumers' negative affective reactions to a store and/or its environment. Studies in environmental psychology and marketing that have examined the affective influence of the environment primarily have taken a positive view of affect (i.e., what increases a person's pleasure). In line with Zeithaml's (1988) notion of nonmonetary costs, we focus on the negative affect stemming from store environments. This perspective is also consistent with the argument that positive and negative affect are distinct constructs (Babin, Darden, and Babin 1998; Watson, Clark, and Tellegen 1988) and that negative affect has a stronger impact on consumers (Babin and Darden 1996).

Although time/effort costs and psychic costs are conceptually related constructs (e.g., crowding can trigger both perceptions of physical density and a negative emotional reaction to physical density), researchers in economics and marketing have treated them as distinct (e.g., Bender 1964; Zeithaml 1988). In Figure 1, we depict the two constructs as distinct to capture both the rational and the emotional aspects of consumers' nonmonetary costs, while acknowledging the possible correlation between them.

Second, most price-quality research examines consumers' value judgments of a specific product-price combination. In contrast, our study focuses on the broader concept of retail store patronage (rather than product choice per se). We are interested in how people perceive the general price levels for a group of products sold in a store on the basis of what they observe in the store's environment. We label this group "merchandise" to distinguish it from a specific product or brand. Our study posits that merchandise value is a function of perceived merchandise price, merchandise quality, and shopping experience costs.

Third, Zeithaml's (1988) value model focuses primarily on the evaluation of product quality. But in a retail context, consumers evaluate service quality as well as merchandise quality (Mazursky and Jacoby 1986). Therefore, our model incorporates the two types of quality as related but distinct components. An important aspect of shopping in a retail store is the quality of the interactions between store employees and customers, a construct we label "interpersonal service quality." Interpersonal service quality is a part of overall service quality, as defined and measured by Parasuraman, Zeithaml, and Berry (1988). It includes customers being treated well and receiving prompt and personal attention from employees.

Fourth, our study is the first to examine empirically all the relationships in Figure 1 simultaneously. Table 1, which lists prior studies that offer conceptual or empirical support for various hypothesized relationships, shows that though each hypothesized link has conceptual support from one or more studies, 11 of the hypotheses have not been examined empirically. Moreover, only a handful of the studies have examined empirically the remaining hypotheses. Another void revealed by Table I is that each of these studies focuses on just a few of the hypothesized links; no study has examined all the links simultaneously.

## Hypotheses

### Store Environment Determinants of Store Choice Criteria

Insights derived from three interrelated theories—inference theory, schema theory, and the theory of affordances—constitute the overall conceptual foundation for our hypotheses about store environment influences. Inference theory argues that people make judgments about the unknown on the basis of information they receive from cues that are available to them (Huber and McCann 1982; Nisbett and Ross 1980). Schemas are cognitive structures of organized prior knowledge, abstracted from experience, that guide inferences and predictions (Fiske 1982). They help shape people's expectations in new or ambiguous contexts (Fiske and Linville 1980). Similarly, the theory of affordances suggests that people perceive their physical environment as a meaningful entity and that such a perception

conveys information directly to them (Gibson 1979). These theories together imply that consumers attend to design, social, and ambient environment cues when evaluating stores, because they believe that these cues offer reliable information about product-related attributes such as quality, price, and the overall shopping experience (Bitner 1992). For example, a customer entering a store with tile floors, the smell of popcorn, fluorescent lighting, and Top40 music may access from memory a "discount store" schema and infer that the store's merchandise is low priced and of average quality and that the store has minimal service. Empirical evidence supports the idea that information from environmental cues influences consumers' perceptions of service providers (Baumgarten and Hensel 1987) and helps consumers categorize service firms (Ward, Bitner, and Barnes 1992).

**Store design cues.** As environmental psychology theory argues, the most important role of a space (in this case, the store) is its ability to facilitate the goals of its occupants (Canter 1983). For many shoppers, the goal is convenience, which includes getting in and out of the store quickly and finding the merchandise they seek easily. Layout is an example of a design cue that may influence customers' expectations of their efficient movement through a store (Titus and Everett 1995). On the basis of the foregoing evidence, we hypothesize that

H  
sub 1a

: As customers' perceptions of store design cues become more favorable, customers will perceive time/effort costs to be lower.

Prior studies offer empirical support for the link between the general, holistic environment and affect (e.g., Babin and Darden 1996; Donovan and Rossiter 1982; Wakefield and Baker 1998). Thus, poorly designed stores (e.g., a confusing store layout) may cause consumers to incur psychic costs. Mehrabian and Russell's (1974) stimulus-organism-- response theory, which posits that the influence of physical environments is primarily affective, also suggests that poorly designed store environments may reduce shopping pleasure and lead to the deterioration of customers' moods (Spies, Hesse, and Loesch 1997). We therefore propose that

TABLE 1

H  
sub 1b

: As customers' perceptions of store design cues become more favorable, customers will perceive psychic costs to be lower.

Nagle (1987) argues that an important determinant of consumers' responses to price is their perception of the entire purchase situation, which includes store environment. Moreover, in-store atmospherics may generate price beliefs independent of the actual prices and be used to create price differences for essentially undifferentiated products (Kotler 1973). Applying adaptation-level theory (Helson 1964), which posits that contextual factors shape a person's frame of reference for focal stimuli, to a retailing context suggests that store environment cues will influence consumers' price expectations. For example, Thaler (1985) finds that subjects infer that the price of beer is higher if the beer is purchased in an upscale store environment than if it is purchased in a run-down store. Grewal and Baker (1994) report that more favorable store environment perceptions increase the acceptability of the price of a picture frame. However, prior research has not examined how the aspects of store environment influence consumers' general price-level expectations for an entire store. If, for example, consumers had limited price knowledge about the clothing products carried by Gap, what would be their expectations of general price levels, based on store environment cues, before they even examined the price tags? To explore this issue, we formally propose that

H

sub 1c

: As customers' perceptions of store design cues become more favorable, customers will perceive monetary prices to be higher.

Theoretical arguments suggest a direct link between retail store design and perceptions of interpersonal service quality (Baker 1987; Bitner 1992), as do a few empirical studies. For example, in comparing modern-style with traditional-style bank branches, Greenland and McGoldrick (1994) report that consumers find employees in the modern-- style branches more approachable. Crane and Clarke (1988) find that consumers rely on office design to assess the scope and nature of four services (bank, doctors, dentists, and hairstylists). Kotler (1973) notes that a store's atmosphere communicates its level of concern for its customers. Therefore, we propose that

H

sub 1d

: As customers' perceptions of store design cues become more favorable, customers will perceive interpersonal service quality to be higher.

The design of a retail store environment can serve as an important basis for consumers' evaluations of merchandise quality (Kotler 1973; Olshavsky 1985). Mazursky and Jacoby (1986) find that pictures of a store's interior are heavily accessed as cues (even more so than price cues) that consumers use to evaluate merchandise quality. In a study by Gardner and Siomkos (1985), respondents evaluated the same brand of perfume more favorably when the store design was described as having "high-image" attributes (e.g., carpeted floors, wide aisles) than when it was depicted as having "low-image" attributes (e.g., tile floor, narrow aisles). In a restaurant setting, Heath (1995) finds that rest room cleanliness is an important factor in influencing customers' perceptions of overall food quality. The preceding evidence suggests that

H

sub 1e

: As customers' perceptions of store design cues become more favorable, customers will perceive merchandise quality to be higher.

Store social (employee) cues. Eroglu and Machleit (1990) suggest that store social elements (e.g., too many people in too little space) can influence the perception of crowding; however, no empirical research has examined the relationship between store employee cues and consumers' perceptions of time/effort costs in a retail setting. Insights from the limited conceptual research suggest that the number of salespeople on the floor influences customers' time/ effort cost perceptions; for example, the presence of more salespeople may indicate that customers will spend less time searching for merchandise. Therefore,

H

sub 2a

: As customers' perceptions of store employee cues become more favorable, customers will perceive time/ effort costs to be lower.

Prior research suggests that salespeople play a critical role in influencing consumers' moods and satisfaction (Grewal and Sharma 1991). According to a component of Barker's (1965) theory of behavioral ecology, when the number of people in a facility is less than the setting requires to function properly, a condition identified in sociology as "understaffing" occurs. The understaffing framework suggests that the

number of employees in a store influences customers' perceptions and responses (Wicker 1973). Thus, when too few salespeople are on the floor (relative to customer density), customers can become frustrated and annoyed. Therefore,

H

sub 2b

: As customers' perceptions of store employee cues become more favorable, customers will perceive psychic costs to be lower.

On the basis of adaptation-level theory and using the same logic we used to develop H

sub 2c

, we also hypothesize that

H

sub 2c

: As customers' perceptions of store employee cues become more favorable, customers will perceive monetary prices to be higher.

The understaffing framework (Wicker 1973) also suggests that store employee cues are likely to influence interpersonal service quality perceptions (Baker 1987). The number and appearance of employees in a retail setting are tangible signals of service quality (Parasuraman, Zeithaml, and Berry 1988). Recent research also suggests that employee-customer interactions affect consumers' assessments of service quality (Hartline and Ferrell 1996). Therefore, cues of positive interactions between customers and employees, such as acknowledging customers as they enter the store, also may influence interpersonal service quality perceptions. We predict that

H

sub 2d

: As customers' perceptions of store employee cues become more favorable, customers will perceive interpersonal service quality to be higher. Store employee cues are expected to have a positive influence on merchandise quality perceptions. Two studies that include descriptions of store employees as part of the overall store scenario find a positive influence of store environment on merchandise quality perceptions. Gardner and Siomkos (1985) depict salespeople as either sloppily dressed, nasty, and uncooperative or sophisticated, friendly, and cooperative. Akhter, Andrews, and Durvasula (1994) describe store employees in terms of their friendliness and knowledge. Therefore,

H

sub 2e

: As customers' perceptions of store employee cues become more favorable, customers will perceive merchandise quality to be higher.

Store ambient (music) cues. Research suggests that music that is perceived as favorable may influence consumers' perceptions of the time spent waiting (e.g., Chebat, Gelinas-Chebat, and Filiatrault 1993; Hui, Dube, and Chebat 1997) and thus should reduce consumers' perceptions of time/effort costs. Therefore, we hypothesize that

H

sub 3a

: As customers' perceptions of store music cues become more favorable, customers will perceive time/effort costs to be lower.

Ambient elements also have been associated with affective reactions (e.g., Donovan and Rossiter 1982; Greenland and McGoldrick 1994; Wakefield and Baker 1998), which consumers may experience as psychic costs in a retailing context. Some studies have demonstrated empirically that music influences affective responses in general (e.g., Hui, Dube, and Chebat 1997) and can alleviate stress in subjects who are forced to wait (Stratton 1992). However, there is a lack of research on the effects of music on psychic costs in retail settings. To address this void and on the basis of the aforementioned studies, we propose that

H

sub 3b

: As customers' perceptions of store music cues become more favorable, customers will perceive psychic costs to be lower.

Invoking adaptation-level theory and using the same logic we used to develop H1 and H2,, we further hypothesize that

H

sub 3c

: As customers' perceptions of store music cues become more favorable, customers will perceive monetary prices to be higher.

Ambient cues also may influence customers' perceptions of interpersonal service quality. Several researchers have advanced conceptual arguments in support of a link between service quality and store environment perceptions as a whole (Baker 1987; Bitner 1992; Greenland and McGoldrick 1994; Kotler 1973). However, no empirical study has examined the specific relationship between instore music cues and perceived interpersonal service quality. To test whether such a relationship exists, we propose that

H

sub 3d

: As customers' perceptions of store music cues become more favorable, customers will perceive interpersonal service quality to be higher.

In an observational study, shoppers purchased more expensive (inferred higher quality) wine when classical music was played in a wine store than when Top-40 music was played (Areni and Kim 1993). Furthermore, previous research supports a link between music cues and merchandise quality. One study (Gardner and Siomkos 1985) describes the ambient environment as having either no soothing background music or soothing mood music playing in the background, and another (Akhter, Andrews, and Durvasula 1994) describes it in terms of the pleasantness of the music. On the basis of this evidence, we predict that

H

sub 3e

: As customers' perceptions of store music cues become more favorable, customers will perceive merchandise quality to be higher.

Determinants of Merchandise Value

Based on Zeithaml's (1988) work, our model proposes that store patronage intentions are a function of merchandise value, interpersonal service quality, and shopping experience cost perceptions. Extensive prior research suggests a positive relationship between perceptions of product quality and

value (Dodds, Monroe, and Grewal 1991; Grewal et al. 1998; Sirohi, McLaughlin, and Wittink 1998). Extending this finding to retail settings, we expect that

H

sub 4

: The higher consumers' merchandise quality perceptions, the higher their perceptions of merchandise value will be.

Previous studies examining the impact of monetary price on value (e.g., Dodds, Monroe, and Grewal 1991; Grewal et al. 1998; Sirohi, McLaughlin, and Wittink 1998) consistently suggest a negative linkage; that is, the higher the price perceptions, the lower are the product value perceptions. Prior research primarily has examined the effects of manipulated price levels, whereas we focus on the effects of merchandise price levels that consumers infer entirely from store environment cues (i.e., when no price information is provided). Nevertheless, we anticipate a similar negative link between perceived monetary price and value in our study. Therefore,

H

sub 5a

: The higher consumers' monetary price perceptions, the lower their perceptions of merchandise value will be.

The relationship between shopping experience costs and merchandise value remains largely untested. Prior research suggests that consumers incur time/effort costs during the purchase process (Bender 1964; Zeithaml 1988) and that they place a premium on their time (Marmorstein, Grewal, and Fishe 1992). Moreover, "every product has a 'time price' that is implicitly included [in consumers' evaluations]" (Scharry 1971, p. 54). Therefore,

H

sub 5b

: The higher consumers' time/effort cost perceptions, the lower their perceptions of merchandise value will be.

Using similar logic and consistent with Zeithaml's (1988) model, if consumers are frustrated or annoyed with the in-store experience, they may develop a feeling of "giving up more than I am getting," which may be transferred to the merchandise itself. Thus, negative emotions in the form of psychic costs may decrease perceived merchandise value. As such, we predict that

Hx: The higher consumers' psychic cost perceptions, the lower their perceptions of merchandise value will be.

#### Determinants of Store Patronage

Although research consistently has shown that the effects of product quality on behavior are largely mediated by value perceptions (Dodds, Monroe, and Grewal 1991), previous studies have found a direct link between service quality and patronage intentions (e.g., Sirohi, McLaughlin, and Wittink 1998; Zeithaml, Berry, and Parasuraman 1996). Therefore,

H

sub 6

: The higher consumers' interpersonal service quality perceptions, the higher their store patronage intentions will be.

Perceived product value is regarded as the primary driver of purchase

intentions and behavior (Zeithaml 1988). Our research focuses on the broader concept of store patronage intentions, which includes the likelihood of both intending to shop at the store and recommending it to others (see Dodds, Monroe, and Grewal 1991; Zeithaml, Berry, and Parasuraman 1996). Consistent with prior research, we expect a positive link between perceived merchandise value and store patronage intentions.

H

sub 7

: The higher consumers' merchandise value perceptions, the higher their store patronage intentions will be.

Although Zeithaml's (1988) model predicts that the influence of time/effort and psychic costs will operate solely through merchandise value, some prior research also suggests that there are direct effects of these costs on store patronage intentions. The poverty-of-time literature (e.g., Berry and Cooper 1992), the crowding literature (e.g., Eroglu and Harrell 1986; Hui and Bateson 1991), and studies on consumer responses to waiting (e.g., Hui, Dube, and Chebat 1997; Taylor 1994) all suggest that if consumers believe they will spend too much time in a store, they may avoid even entering the store without first processing information about the merchandise value or interpersonal service quality. Thus,

H

sub 8a

: The higher consumers' perceived time/effort costs, the lower their store patronage intentions will be.

Similarly, there may be a direct link between psychic costs and store patronage intentions. Such a link is consistent with the association between affective reactions and behavioral response posited by Mehrabian and Russell (1974) and supported by marketing studies (e.g., Baker, Grewal, and Levy 1992; Donovan et al. 1994; Hui and Bateson 1991; Wakefield and Baker 1998). We therefore predict that

H

sub 8b

: The higher consumers' perceived psychic costs, the lower their store patronage intentions will be.

Method

To test the conceptual model, we used videotapes to simulate a store environment experience. This approach has proved effective for environmental representation (e.g., Bateson and Hui 1992; Chebat, Gelinas-Chebat, and Filiatrault 1993; Voss, Parasuraman, and Grewal 1998). The store in the videotape was a card-and-gift store located in a large, southwestern U.S. city. Subjects viewed a five-minute videotape that visually "walked" them through the store environment, simulating a shopping or browsing experience. They then completed a questionnaire that contained items to measure the model constructs.

We conducted one study to test the model shown in Figure I and a second study to examine the robustness of the results. In Study 1, the subjects were 297 undergraduate students at a large, southwestern U.S. university. In Study 2, the subjects were 169 undergraduate students at a southeastern U.S. university. The majority of the students were business majors who ranged in age from 20 to 25 years. Shopping in a card-and-gift store is within the realm of experience for the student samples used in both studies; 98% of the subjects indicated that they had shopped in a card-and-gift store.



## Experimental Design and Stimuli

To create variation in the environmental stimuli, we produced eight videotaped store scenarios representing low and high levels of design, social, and ambient components in a 2 x 2 x 2 between-subjects research design. The store we videotaped was being remodeled, which enabled us to implement the design manipulations (consisting of changes in color, display accent trim, layout, and general organization of the merchandise) within the same store space. We produced videotapes before the remodeling to represent the low design condition (beige/white color, no gold accent trim, grid layout, and messy displays) and then after the remodeling to represent the high design condition (peach/ green color, gold accent trim, free-form layout, and organized displays). We also manipulated store employee cues during the videotaping sessions. The high social level featured three salespeople wearing professional-looking aprons, one of them greeting "customers" (respondents) as they visually entered the store. The low social level featured just one salesperson who did not wear an apron and did not greet customers. Type of music, which is relatively easy and inexpensive to change from a retailer's standpoint, represented the ambient dimension in our study. We manipulated it by dubbing onto the finished videotapes either classical music (high level) or Top-40 music (low level).<sup>3</sup> Both music selections had a slow tempo to avoid any possible tempo effect. Although the ambient dimension includes elements other than music (e.g., scent, temperature), we could not vary those elements in the videotaped scenarios.

To identify specific environmental attributes to be included in the videotaped scenarios, we invoked insights from the marketing and retailing literature and conducted two focus groups (one student and one nonstudent) to elicit what consumers considered high and low levels of each dimension. Manipulation checks indicated that the treatment manipulations had the intended effect on the three measured factors (i.e., perceived store design cues, store employee cues, and store music cues).<sup>4</sup>

## Measures

We used multi-item scales to measure the model constructs (Table 2 contains the scale items). Literature from environmental psychology (e.g., Mehrabian and Russell 1974; Russell and Pratt 1981), retailing (e.g., Donovan and Rossiter 1982), and marketing (e.g., Bitner 1990; Gardner and Siomkos 1985) provided the basis for the store environment perception and psychic cost scales. We derived scale items for the other constructs from the price, quality, and value literature. Time/effort cost items were based on Zeithaml's (1988) conceptualization of nonmonetary price and adapted from Dodds, Monroe, and Grewal's (1991) scales. We developed monetary price measures from items suggested by Dodds, Monroe, and Grewal (1991) and Zeithaml (1984). We adapted the four interpersonal service quality items from the SERVQUAL scale (Parasuraman, Zeithaml, and Berry 1988). We measured merchandise quality, merchandise value, and store patronage intentions with scales developed by Dodds, Monroe, and Grewal (1991). We pretested the questionnaire several times and refined it on the basis of the pretest results.<sup>5</sup>

Following Anderson and Gerbing (1988), we conducted confirmatory factor analysis to assess the reliability and validity of the multi-item scales for the ten model constructs (Table 2). Although the chi-square ( $\chi^2$ )

sup 2

) value for the measurement model was significant for both data sets ( $p < .01$ ), this statistic is sensitive to sample size and model complexity; as such, the goodness-of-fit index (GFI), nonnormed fit index (NNFI), and comparative fit index (CFI) are more appropriate for assessing model fit here (e.g., Bagozzi and Yi 1988; Bearden, Sharma, and Teel 1982).

For Study 1, the GFI (.89), NNFI (.94), and CFI (.95) indicate satisfactory

model fit. Furthermore, all the individual scales exceeded the recommended minimum standards proposed by Bagozzi and Yi (1988) in terms of construct reliability (i.e., greater than .60) and percentage of variance extracted by the latent construct (greater than .50). Although the measurement model fit the Study 2 data somewhat less well, the construct reliability scores again exceeded .60, and the percentage of variance extracted by the latent construct exceeded .50 for all scales except the merchandise value perception scale. Next, we assessed whether the measurement model sat

isfied three conditions that demonstrate discriminant validity: (1) For each pair of constructs, the squared correlation between the two constructs is less than the variance extracted for each construct; (2) the confidence interval for each pairwise correlation estimate (i.e.,  $\pm$  two standard errors) does not include the value of 1; and (3) for every pair of factors, the  $X$

sup 2

value for a measurement model that constrains their correlation to equal 1 is significantly greater than the  $X$

sup 2

value for the model that does not impose such a constraint. Collectively, these conditions represent 360 individual tests of discriminant validity. Of these 360 tests, only 1 suggested that two of our constructs might not be distinct; namely, the squared correlation between perceived merchandise value and store patronage intentions for the Study 2 data exceeded the variance extracted for the perceived merchandise value construct. On the basis of these results, we conclude that our scales measure ten distinct constructs. Construct correlation estimates, along with standard errors for both data sets, are provided in Table 3.6

## Analysis and Results

The purpose of Study 1 was to examine how well the proposed conceptual model (Figure 1) fit the data and to explore improvements to the model. The purpose of Study 2 was to evaluate the robustness of the Study 1 results by (1) reestimating the model suggested by the Study 1 sample to determine if the same relationships held for a new sample and (2) statistically comparing the parameter estimates from the two samples to ascertain whether there were significant differences.

### Study 1: Evaluating the Proposed Model

We tested the hypothesized relationships using maximumlikelihood simultaneous estimation procedures (LISRELVIII; Joreskog and Sorbom 1996). Consistent with MacKenzie and Lutz's (1989) recommendations, we represented each latent construct with a single index that we calculated by averaging the item scores on the construct's scale. We established the scale of measurement for each construct by fixing its loading ( $\lambda$ ) to be the square root of its reliability, and we incorporated potential measurement error into each scale by setting the error term at one minus the construct reliability. Because there was a variety of measurement scales for the different constructs, we used a correlation matrix as the input.

#### TABLE 2

#### TABLE 3

We first evaluated the proposed model by estimating the standardized path coefficients for the hypothesized links in Figure 1. The column labeled "Proposed Model" in Table 4 presents these coefficients. The  $X$

sup 2

value for this model was significant ( $p < .01$ ), but the GFIs indicated satisfactory fit. Of the 23 proposed relationships, 14 were statistically

significant.

We then constrained the 9 nonsignificant paths to zero and reestimated the structural model. The results are summarized in the "Revised Model" column of Table 4. The 14 remaining paths were statistically significant. Although the X

sup 2

value for the revised model was somewhat higher, any corresponding decrease in fit compared with the original model was not significant (X

sup 2

difference = 9.2, 9 degrees of freedom [d.f.],  $p > .10$ ). Moreover, the other fit indices were virtually the same as those for the original model.

The results from Study I suggest eliminating three sets of paths: (1) from employee cue perceptions to time/effort cost perceptions, psychic cost perceptions, monetary price perceptions, and merchandise quality perceptions; (2) from music cue perceptions to time/effort cost perceptions, interpersonal service quality perceptions, and merchandise quality perceptions; and (3) from time/effort and psychic cost perceptions to merchandise value perceptions. Figure 2 shows the revised model after deleting these paths.

#### Study 2. Replicating the Revised Model

We used Study 2 to examine the robustness of the model in Figure 2. The revised model fit the data from Study 2 well. The "Replication Analysis" column of Table 4 contains the fit statistics. Of the 14 paths that were statistically significant in Study 1, 12 were also significant in Study 2. The paths from music cue perceptions to monetary price perceptions and from time/effort cost perceptions to store patronage intentions were nonsignificant.

We then assessed whether the strength of the relationships observed in the two studies was statistically different by testing the equivalence of the parameter estimates across samples using multigroup analysis (Joreskog and Sorbom 1996). First, we estimated the revised model by constraining all parameters to equality across the two samples (see the "Multisample Analysis" column in Table 4). This analysis produced an overall X

sup 2

value of 142.0 (with 80 d.f.). Second, allowing a single parameter estimate to vary freely between the two samples, we estimated a second X

sup 2

(with 79 d.f.) and evaluated the X

sup 2

difference (with 1 d.f.). A significant X

sup 2

difference implies a significant difference in the strength of the corresponding link across the two samples. We conducted 14 such tests. Of the 14 links examined, the strength of only 1 differed significantly between the two samples; namely, the relationship between merchandise value perceptions and store patronage intentions was much stronger in the replication analysis. Thus, the relationships in the revised model appear to be robust across the two studies.<sup>7</sup>

TABLE 4

FIGURE 2

## Exploring the Predictive Validity of the Revised Model

Because our study represents one of the first attempts to test empirically a comprehensive retail patronage model, we were interested in examining the predictive validity of the revised model and exploring the relative contribution of the predictor variables in explaining variations in the two key criterion variables: perceived merchandise value and store patronage intentions. To examine these issues, we used the multisample analysis mentioned previously. We summarize the results in Table 5.

As Table 5 shows, the model explained a high percentage of the variation in perceived merchandise value (68%), and its most important predictor was monetary price perceptions ( $-.91$ ). Other significant predictors of value included merchandise quality perceptions, which had a direct, positive effect (.64); design cue perceptions, which had an indirect, positive effect (.16); and music cue perceptions, which had an indirect, positive effect (.17).

The model also explained a high percentage of the variation in store patronage intentions (54%), and all predictor variables had significant direct or indirect effects. As might be expected, merchandise value perceptions had the strongest direct effect (.37), but psychic cost perceptions also had a strong direct effect ( $-.31$ ), time/effort cost perceptions had a significant direct effect ( $-.17$ ), and interpersonal service quality had a significant direct effect (.23). Perceptions of store environment (especially design cue perceptions), merchandise quality perceptions, and monetary price perceptions all had significant indirect effects on store patronage intentions.

## Discussion and Implications

Important linkages among store environment cues, store choice criteria, and store patronage intentions have been investigated on a piecemeal basis, if at all, in previous conceptual and empirical studies (see Table 1). As such, our conceptual model (Figure 1) contributes to the extant literature by offering an integrative synthesis of insights from previous studies, as well as from the theories invoked in positing the relationships in the model. In addition, to our knowledge, our research is the first attempt to examine empirically a comprehensive store patronage model. Our research is also the first to examine empirically the effects of shopping experience costs (i.e., time/effort and psychic costs) on merchandise value and patronage intentions. Although time/effort and psychic costs have been proposed as determinants of perceived value (e.g., Zeithaml 1988), they have not been operationalized, nor have their effects been assessed empirically in a retailing context.

TABLE 5

By simultaneously varying three sets of store environment cues in videotaped scenarios and assessing their individual impacts on respondents' store choice criteria, our research provides some insight into the differential effects of the cues, something that heretofore has not been investigated. However, because the findings from our study do not support some of the hypothesized links, our inferences about the relative effects of store environment cues are necessarily preliminary. Nevertheless, the lack of support for some of the links, along with some surprising findings (e.g., the finding that the effects of shopping experience costs on patronage intentions are not mediated through perceived merchandise value perceptions), raises intriguing issues that pertain to the cognitive/behavioral processes that may underlie the empirical results and the boundary conditions for the observed effects. We identify and discuss these issues in the following sections.

## Limitations

As is usually the case with studies conducted in simulated environments

, our research has some shortcomings. Videotaped scenarios, though more experiential and realistic than written scenarios (the type of stimuli used in many studies), are not capable of representing the full range of environmental attributes, especially in the ambient dimension. Because of this technological limitation, the stimuli in our study captured a wider range of attributes in the design dimension than in the social or ambient dimensions. Therefore, a potential explanation for the strong design effects observed in our study is that the nature of the shopping experience simulated by the videotaped scenarios might have caused respondents to pay less attention to the employees and music than they would have during an actual shopping trip. However, our manipulation checks (summarized in n. 4) reveal that all three manipulations produced significant differences and that the differences produced by the employee and music manipulations are more pronounced. Therefore, the relatively strong design cue effects seem unlikely to have been triggered by an experimental artifact. Nevertheless, additional research using videotaped scenarios should incorporate more facets of the social dimension (e.g., presence of other customers, crowding, waiting lines) and ambient dimension (e.g., music tempo, noise levels) to produce stimuli that are more balanced across the three store environment dimensions. In case respondents deliberately look for cues because they know they are reacting to a **simulated environment**, a balanced scenario will offer similar opportunities for the various cues to be noticed.

Different store scenarios incorporating greater cue variety also will help address other issues, such as whether the number and types of customers in a store influence the respondents' (i.e., potential customers') perceptions. In addition, will the absence of social (employee) cue effects on time/effort and psychic cost perceptions (revealed in Table 4) hold when customer crowding is varied along with number of salespeople? In other words, will having many easily recognizable salespeople in a store have a more pronounced effect on shopping experience costs when the store is crowded than when it is not, as was the case in our research?

Another limitation of our research is that two of the ten constructs in our model (monetary price and merchandise quality) were measured with two-item scales. Although both scales have acceptable construct reliabilities in Studies I and 2 (Table 2), their reliabilities are generally lower than for the other constructs.

#### Theoretical and Research Implications

As the results in Table 4 and Figure 2 show, design cues have a stronger and more pervasive influence on customer perceptions of the various store choice criteria than do store employee and music cues. As we argued in the preceding section, this influence is unlikely to have been due solely to the content of the videotaped scenarios. Bettman (1979) suggests that in external search for information, consumers may allocate different amounts of processing capacity (i.e., attention) to various stimuli. Given that design cues are visual whereas ambient cues tend to affect the subconscious (Baker 1987), it is possible that subjects in our study paid more conscious attention to design cues than to music cues. Moreover, prior research on memory has found that because pictures have a superior ability to evoke mental imagery, they are more easily remembered than verbal information (e.g., Lutz and Lutz 1978; Paivio 1969). Although this stream of research focuses on pictures versus verbal stimuli (e.g., written words), it suggests that design cues in a store environment may evoke more vivid mental images than do music cues. The dominance of design cues over employee cues may have occurred because subjects experienced the latter only during the initial minute of the videotaped scenario as they entered the store and started browsing. Nevertheless, given that store environments typically contain more design cues than employee cues, consumers in such environments might experience these cues in a manner similar to the way our study subjects experienced them.

In addition to the respondents' cognitive processes in interpreting the

store scenarios, contextual factors (e.g., type of store, product category) may offer alternative explanations for the findings. We explore these possibilities and offer directions for further research as we discuss the key results pertaining to each of the endogenous constructs.

Shopping experience costs. As hypothesized, design cue perceptions have a significant, negative effect on time/effort and psychic cost perceptions in both studies. Moreover, this effect is consistently stronger for the psychic cost component than for the time/effort cost component (e.g., the structural coefficients for the two components in the multisample analysis, as shown in the last column of Table 4, are  $-.62$  and  $-.40$ , respectively). Thus, although design aspects influence perceived shopping speed and efficiency, they have an even stronger impact on the perceived stress involved in shopping, which is an important finding worthy of further research.

Employee cue perceptions have no impact on either time/effort or psychic costs. Our rationale for hypothesizing these effects (H

sub 2a

and H

sub 2b

) was based solely on limited conceptual work (see Table 1). Therefore, our research is an inaugural attempt to examine these hypotheses empirically. However, because the lack of support for them was consistent across two studies and because the manipulation checks showed that the employee cue manipulations produced the intended effects (n. 4), purchasing context is a plausible explanation for this finding. In other words, consumers may possess various schemas for different types of retail stores and/or product categories that moderate the strength of the hypothesized links. Questions such as the following can help structure research that attempts to examine the generalizability of this finding and boundary conditions for it: Is the apparent lack of impact of employee cues on shopping experience costs limited to stores that are typically self-service, as the store was in our study? Is the impact likely to vary across different categories of retail establishments (e.g., restaurants, supermarkets, jewelry stores, discount outlets) and different types of merchandise (e.g., food, groceries, luxury products, durable goods)?

Music cue perceptions have a consistent but modest negative effect on perceived psychic costs. This finding coincides with that of the only previous empirical study pertaining to this hypothesized effect (Stratton 1992). Music cues did not have a significant impact on perceived time/effort costs, contrary to what we posited on the basis of past studies (which, as Table I shows, all have been conceptual). Our conceptual rationale for suggesting relationships between music cue perceptions and the two types of shopping experience costs was basically the same; namely, favorable music perceptions would alleviate both types of costs. This rationale requires rethinking in light of the differential effects revealed by the simultaneous empirical examination of music's impact on time/effort and psychic costs. Many prior marketing studies have found that music has an affective influence on consumers (e.g., Bruner 1990), but few have examined the cognitive effects of music. In our study, psychic costs were more affective in nature than were time/effort costs. Several time-perception studies have found cognitive effects of music in terms of time duration estimation (e.g., Kellaris and Mantel 1994). However, in these studies, respondents were asked to estimate actual time duration after being exposed to pieces of music rather than to infer instore time/effort costs on the basis of music cues. Therefore, why music cues might have a differential impact on the two types of costs (and, in a broader sense, why music cues might have different influences on affective and cognitive responses) and whether the nature of that impact might vary across different purchasing contexts remain important issues for further

research.

Monetary price. Findings from both studies offer support for the hypothesized positive effect of store design perceptions on perceived monetary price (i.e., a high image store design leads to correspondingly high expected prices). However, our results show no significant effect of employee cues in either study. The effect of music cues is significant in Study 1 but not in Study 2. As discussed in footnote 6, this difference is unlikely to have been caused by demographic differences between the two study samples. Moreover, the effect in Study 1 is negative, contrary to the hypothesized direction. Because both studies used the same study context, the presence of the unexpected negative effect in Study 1 but not Study 2 suggests that the effect observed in Study 1 may be spurious; that is, similar to the effect of employee cues, in reality the effect of music on monetary price perceptions may be negligible rather than negative.

In developing our hypotheses, we invoked adaptation-- level theory (Helson 1964) to argue that customers would use the overall store environment as a frame of reference to make predictions about prices; in other words, more favorable (i.e., higher image) perceptions of all three types of environmental cues (design, employees, and music) would lead customers to expect higher monetary prices. No empirical studies pertaining to any of these posited links were available. Our study fills this empirical void and suggests a need for more theoretical work to understand the differential effects of the various cues. The findings suggest that the predicted positive relationship holds only for visual, design-- related cues. Why it might not apply to other types of cues and whether and how product or store contexts might influence it require additional research.

Merchandise quality. Design cue perceptions are the only significant antecedents of merchandise quality perceptions, and their impact is consistently strong across studies. We did not find that employee and music perceptions affected merchandise quality perceptions, though two previous empirical studies find such links (Akhter, Andrews, and Durvasula 1994; Gardner and Siomkos 1985). A key methodological difference between those studies and the current research is that their stimuli included only two descriptive scenarios--high image and low image--in which employee and music cues were provided through written descriptions. In contrast, our research used eight videotaped scenarios in which all three types of cues were manipulated. Therefore, a plausible explanation for the differences in the results is that the respondents in the preceding two studies may have paid more explicit attention to the written descriptions of the employees and music, thereby accentuating their impact. Moreover, the written descriptions in some cases used wording that was extreme and/or leading (e.g., "sloppily dressed, nasty, and uncooperative" salespeople versus "sophisticated, friendly, and cooperative" salespeople). In our videotaped scenarios, the employee and music cues were part of a more realistic overall store environment. A contribution of our research, and one of its strengths compared with previous studies, is the examination of consumers' reactions to multiple store **environment** cues presented simultaneously in as realistic a **simulated environment** as was allowed by the videotaping technology we used. As such, the differential effects our results reveal augment the extant literature and call for additional research to understand the differences better.

Interpersonal service quality. Our research focused on just the interpersonal component of service quality. As hypothesized, employee and design cues significantly affect interpersonal service quality perceptions, but music cues have no significant impact on them. Whereas one previous study shows a positive link between perceptions of music and overall store service (Chebat 1997), our findings suggest that perceptions of the interpersonal component of customer service are independent of music perceptions. A plausible explanation for these findings, previously discussed, is that when customers process auditory and visual cues to predict the level of personal service they are likely to receive, the visual cues projected by a store's design and employees dominate. An area for further inquiry is the identification of circumstances or contexts in

which auditory cues may convey information to customers about interpersonal service quality.

Merchandise value. Our empirical findings regarding the determinants of perceived merchandise value are consistent with the general notion that customers infer value by trading off what they give up relative to what they are likely to get (e.g., Zeithaml 1988). However, our results offer additional and somewhat surprising insights about merchandise value perception formation in a retailing context. Specifically, of the four hypothesized drivers of perceived merchandise value—time/effort costs, psychic costs, merchandise quality, and monetary price—only the last two are significant. The finding that neither time/effort nor psychic costs influences perceived merchandise value runs counter to the commonly held belief that both monetary and nonmonetary price are integral to the "give" component of perceived value. Contrary to what the extant literature (e.g., Zeithaml 1988) suggests, when customers assess merchandise value before purchase in a retailing context, they apparently do not integrate monetary price and time/effort and psychic costs in inferring what they must give up. Rather, their value assessments seem to rest solely on the trade-off between monetary price and merchandise quality.

Because this inference challenges conventional knowledge about the cognitive processes that customers use in perceiving value, researching its robustness should be a high priority. Woodruff (1997) offers theoretical arguments to propose that value is a dynamic construct whose content and evaluative criteria change as customers gain experience. Consistent with this dynamic notion of value and based on our findings, one useful avenue for further research is to examine empirically value perceptions at different stages of the purchase process. By the very nature of the scenarios and measures we used, all perceptual data collected in this research pertained to potential customers' prepurchase evaluations. Will similar findings emerge in postpurchase contexts? That is, will customers' actual purchase or use experience make psychic and time/effort costs more salient when customers take stock of the overall value they received? If so, are they more likely to integrate monetary and nonmonetary prices in postpurchase contexts? Will psychic and time/effort costs still have a direct impact on patronage intentions, or will their impact be mediated by perceived value? A related question worth investigating is how much more consumers are willing to pay to avoid the time/effort and psychic costs associated with longer waits due to insufficient staff and/or poorly designed stores. Answers to these questions will enrich our understanding of perceived value formation.

Our results also suggest that perceived monetary price, relative to merchandise quality, has a substantially stronger influence on perceived merchandise value, even though the videotaped scenarios contained no price information. Is this finding unique to gifts purchased in a card-and-gift store (i.e., small-ticket items bought from relatively small stores to be given to someone else), or does it extend to other merchandise and store types (e.g., a luxury item for personal use purchased from a large specialty store)? Evidence suggesting that perceived monetary price's dominant role transcends merchandise and store types would call into question the conventional wisdom and popular belief that superior merchandise quality can offset any erosion in perceived value caused by high prices. More research is needed to develop a clearer understanding of store environment's influence on potential customers' monetary price perceptions and the role of these perceptions on perceived value formation.

Store patronage intentions. All four hypothesized antecedents of store patronage intentions—interpersonal service quality, merchandise value, time/effort costs, and psychic costs—significantly influence patronage intentions, as was shown by the multisample analysis results; perceived merchandise value and psychic costs are particularly strong determinants of patronage intentions. However, there are a couple of notable differences between the two studies. In the replication study, the impact of time/effort costs is considerably weaker, and the impact of merchandise



value is considerably stronger. As explained in footnote 6, demographic differences between the two samples probably cannot explain these results. Differences in relevant respondent attributes that are not measured in our research might account for the between-sample differences in the strengths of the effects of time/effort costs and merchandise value. This possibility calls for research aimed at identifying such attributes and examining whether customer segments defined by those attributes react differently to the same store environment cues.

Finally, the insights from this research are based on perceptual and intention measures provided by respondents after they finished viewing the videotaped scenarios. Further research could supplement these measures with more qualitative methodologies, such as having respondents generate verbal protocols as they experience the store scenarios. Additional insights from such interpretive research might provide a richer understanding of the process by which store environment cues influence customers. For example, which cues do customers notice first? Which cues are noticed most often? What interpretations do customers attach to specific cues, and do those interpretations vary across customers?

#### Managerial Implications

As implied by our discussion in the preceding sections, our research both offers new and significant insights and emphasizes the need for continuing research to examine the generalizability of our findings and enhance our understanding of the impact of store environment cues on store choice criteria and patronage intentions. Therefore, any recommendations for retailing practice based on our findings should be viewed more as food for thought than as a definitive prescription. With that caveat in mind, managers can benefit by considering the following practical implications that stem from our research.

The significant and consistent influence of design cues on shopping experience costs, especially psychic costs (see the first two rows of Table 4), underscores the need for retailers to give careful consideration to store design features (e.g., store layout, arrangement of merchandise). These features have great potential to influence would-be shoppers' psychic costs and therefore their shopping experience and store patronage behavior. As Table 5 shows, among the various direct and indirect determinants of patronage intentions, design cues have the strongest influence, with total effect of .43. Creating a superior in-store shopping experience is critical and could provide an effective competitive weapon for bricks-and-mortar retailers that face growing competition from Internet-based e-tailers offering similar merchandise at the same (or lower) prices.

Although our research focuses on bricks-and-mortar stores, the nature and strength of the findings suggest that we can extend some of their implications to e-stores as well. Specifically, according to our findings pertaining to design factors and because design is the dominant (if not only) environmental component e-shoppers experience, it seems reasonable to speculate that the design of e-stores (e.g., appearance and layout of home pages) may affect eshoppers' perceived psychic costs significantly and thus their propensity to shop at those stores.

Store design features also influence monetary price perceptions. However, this effect is relatively small (structural coefficient of .24 in the multisample analysis) compared with the negative effect that design cue perceptions have on time/effort (-.40) and psychic (-.62) costs or with the positive effect that design cue perceptions have on interpersonal service quality (.49) and merchandise quality (.59) perceptions. This finding implies that retailers offering a high-- image design may be perceived as offering high quality and value, even though monetary prices are perceived as high.

Of the two key drivers of merchandise value-monetary price and merchandise quality-the former is consistently the dominant driver, having a structural coefficient of -.91 compared with a coefficient of .64 for merchandise quality. Moreover, as Table 5 shows, perceived monetary price has the

strongest total effect on perceived merchandise value among all direct and indirect antecedents. Thus, although merchandise quality inferences triggered by store environment cues strongly influence perceived value, perceptions of monetary price stemming from those cues have an even stronger impact. This differential effect suggests that retailers attempting to attract customers by presenting a highclass image through their store environment cues should consider using communication strategies to counteract the disproportionately high decrease in perceived merchandise value that might result from customers' inference of high monetary prices.

Finally, although customers' perceptions of time/effort and psychic costs apparently do not influence how they assess merchandise value, these shopping experience costs directly and strongly influence store patronage intentions. This result has an important implication for retailers: When store environment cues trigger high shopping experience costs, potential customers may avoid the store altogether without weighing those costs against the potential benefits (i.e., high merchandise quality and/or low monetary prices). As such, incorporating store design features that signal a low-stress shopping environment should be a top priority for retailers striving to attract new customers.

These dimensions, discussed by Baker (1987), are consistent with the ones Bitner (1992) uses in describing "servicescapes." Bitner's three dimensions are ambient; space/function (similar to design); and signs, symbols, and artifacts. Whereas marketing researchers traditionally have approached the design and ambient cues under the umbrella construct of store atmospherics, researchers in the field of environmental psychology distinguish between them for two fundamental reasons. First, ambient cues tend to affect nonvisual senses, whereas design cues are more visual in nature. Second, ambient cues tend to be processed at a more subconscious level than are design cues. There is some empirical evidence that design and ambient elements have differential effects, on consumer responses (Wakefield and Baker 1998).

2The perceived favorableness of music depends on both the pleasantness of the music and the extent to which the music is perceived as appropriate for the context in which it is played (Macinnis and Park 1991). Both these aspects were captured by our measure of perceived favorableness of store music.

3 Five types of music-classical, Top-40, country-and-western, oldies, and easy listening-were pretested. The respondents (157 upper-level undergraduate business students) listened to all five selections and used seven-point scales to rate the likelihood that each selection would be heard at high- and low-image stores. The five selections then were rank ordered from highest to lowest on the basis of the mean ratings. The classical selection ranked as the music most associated with the high-image store. The Top-40 selection was the second lowest ranked music but was chosen because this type of music was deemed more likely to be used by a card-and-gift store than was country-and-western music, which was the lowest ranked music.

4To ensure that the manipulations produced the intended effects, we conducted manipulation checks in a pretest and again in the main study. In the high store employee level, the salesperson was perceived as significantly more friendly and helpful than in the low level (pretest means = 5.52 versus 4.12,  $p < .05$  [one-sided]; main study means = 5.25 versus 4.01,  $p < .01$ ). The high design level was perceived to be more attractive and pleasing than was the low level (pretest means = 5.55 versus 5.16,  $p < .05$ ; main study means = 5.61 versus 5.35,  $p < .05$ ). Finally, subjects perceived the classical music as creating a more positive ambience than the Top-40 music (pretest means = 5.58 versus 3.64,  $p < .01$ ; main study means = 5.42 versus 3.85,  $p < .01$ ). Thus, the three experimentally manipulated variables created the desired variation.

5The purpose of the experimental manipulations in our study was to create sufficient variation in perceived environmental conditions. To estimate the

paths in our structural model (Figure I), we pooled the scaled responses across treatments. However, to ensure that such pooling was justifiable, one reviewer suggested that we conduct analyses of variance to examine if there were any significant interaction effects. We assessed the impact of all two-way and three-way treatment interactions on each of the seven endogenous variables across the two studies-a total of 56 interaction tests. The results indicated that only 5 of the 56 interaction effects were significant at the  $p < .05$  level; moreover, none of the interaction effects was significant in both studies. These results suggest that any interaction effect among the endogenous variables was negligible.

6The pairwise correlations presented in Table 3 indicate that the magnitude of correlation for the closely related constructs of time/ effort cost perceptions and psychic cost perceptions ranges from .39-.47, which implies that the shared variance between this pair of constructs is in the range of 15%-22%. We believe that this is a relatively low degree of overlap, likely due to the perceptions sharing a "common cause": They are all triggered by the same set of store environment cues.

7We also explored the possibility that demographic differences across the two samples might explain the different findings across samples. Sample 2 was significantly older and contained a higher percentage of women. Because previous research has suggested that women perceive environmental cues differently than men, we split the combined samples on the basis of sex and reexamined the structural relationships for both groups. This analysis did not indicate that men and women reacted in a significantly different manner.

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...TEXT: of Barker's (1965) theory of behavioral ecology, when the number of people in a **facility** is less than the setting requires to function properly, a condition identified in sociology as...S. city. Subjects viewed a five-minute videotape that visually "walked" them through the store **environment** , **simulating** a shopping or browsing experience. They then completed a questionnaire that contained items to measure...issues in the following sections.

#### Limitations

As is usually the case with studies conducted in **simulated environments** , our research has some shortcomings. Videotaped scenarios, though more experiential and realistic than written scenarios...

... In case respondents deliberately look for cues because they know they are reacting to a **simulated environment** , a balanced scenario will offer similar opportunities for the various cues to be noticed.

Different... its strengths compared with previous studies, is the examination of consumers' reactions to multiple store **environment** cues presented simultaneously in as realistic a **simulated environment** as was allowed by the videotaping technology we used. As such, the differential effects our...on Shopping Behavior: Classical Versus Top-- Forty Music in a Wine Store," in Advances in **Consumer Research** , Leigh McAlister and Michael L. Rothchild, eds. Provo, UT: Association for **Consumer Research** , 336-40.

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, 612-16.

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Model...

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6/6,K/1 (Item 1 from file: 15)

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02531040 204192441

\*\*USE FORMAT 9 FOR FULL TEXT\*\*

**Methodological issues in conjoint analysis: A case study**

2001 LENGTH: 21 Pages

WORD COUNT: 9158

...TEXT: and training), 25 (photographic and no training) and 28 (photographic and training). Prior to hypothesis **testing**, the effects on **product** choices of the attributes pertaining to selection, country of origin and other information on product...R.R., Harlam, B.A., Kahn, B.E. and Lodish, L.M. (1992), "Comparing dynamic **consumer** choice in real and computer- **simulated environments**", Journal of **Consumer Research**, Vol. 19 No. 1, pp. 71-82.

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Dahan, E. and Srinivasan, V. (2000), "The predictive power of Internet based **product** concept **testing** using visual depiction and animation", Journal of **Product Innovation Management**, Vol. 17 No. 2, pp. 99-109.

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6/6,K/2 (Item 2 from file: 15)

DIALOG(R)File 15:(c) 2003 ProQuest Info&Learning. All rts. reserv.

02000233 51252655

\*\*USE FORMAT 9 FOR FULL TEXT\*\*

**A theoretical and empirical exegesis of the consumer involvement construct: The psychology of the food shopper**

Fall 1999 LENGTH: 12 Pages

WORD COUNT: 6381

...TEXT: remain robust. This positive evidence of the robustness of these often-identified factors, despite changing **testing** conditions (varied **product** groups, respondent sample size, nationality and make-up, and historical context etc.), suggests that the...

...Management, London.

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6/6,K/3 (Item 1 from file: 148)

DIALOG(R)File 148:(c)2003 The Gale Group. All rts. reserv.

09646584 SUPPLIER NUMBER: 17852275 (USE FORMAT 7 OR 9 FOR FULL TEXT)  
**Virtual reality techniques in NPD research. (new product development)**

Oct, 1995

WORD COUNT: 4925 LINE COUNT: 00438

... Eliminate Reduce assembly steps  
 steps and  
 Create more reliable products  
 Speed-up Install on-line **product testing**  
 and  
 Computer-aided manufacturing  
 Parallel Provided collateral  
 processing and/or  
 Contingency facilities  
 Acceleration Marketing  
 methods...August, pp 28-34.  
 BURKE, R., HARLAM, B., KAHN, B. & LODISH, L. (1992). Comparing dynamic  
**consumer** choice in real and computer- **simulated environments** . Journal  
 of **Consumer Research** , 19, 1, pp 71-82.  
 BUZZELL, R. & GALE, B. (1987). The PLMS principles. New York...  
 ...test-market models: a critical evaluation. In Henry Walter, Michael  
 Menasco & Hirokazu Takada (Eds.), New **product** development and **testing** ,  
 Massachusetts/Toronto: Lexington Books, pp 151-186.  
 SILK, ALVIN J. & URBAN, GLEN L. (1978). Pre...

6/6,K/4 (Item 2 from file: 148)

DIALOG(R)File 148:(c)2003 The Gale Group. All rts. reserv.

08584936 SUPPLIER NUMBER: 18173785 (USE FORMAT 7 OR 9 FOR FULL TEXT)

**The impact of context on variety seeking in product choices.**

Dec, 1995

WORD COUNT: 8741 LINE COUNT: 00709

... stimulation in the context leading to more impact on  
 variety-seeking behavior. Specifically, we are **testing** the following  
 hypotheses.

H1: Variety seeking in one **product** class (target) can be reduced by  
 providing more variety in another product class (context) that...Kahn, and  
 Leonard M. Lodish (1992), "Comparing Dynamic Consumer Decision Processes in  
 Real and Computer- **Simulated Environments** ," Journal of **Consumer**  
**Research** , 18 (June), 71-82.

Driver, Michael J. and Siegfried Streufert (1965), "The 'General  
 Incongruity Adaptation...

?pause

?

PLEASE ENTER A COMMAND OR BE LOGGED OFF IN 5 MINUTES

?show files; ds

File 15:ABI/Inform(R) 1971-2003/Sep 01

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File 148:Gale Group Trade & Industry DB 1976-2003/Sep 02

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 File 636:Gale Group Newsletter DB(TM) 1987-2003/Sep 02  
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 File 810:Business Wire 1986-1999/Feb 28  
 (c) 1999 Business Wire  
 File 813:PR Newswire 1987-1999/Apr 30  
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Set	Items	Description
S1	9592	ENVIRONMENT?? (10N) (MOCK OR SIMULATED OR SIMULATING OR IM-ITAT?)
S2	135474	CONSUMER (10N) (SEARCH OR RESEARCH)
S3	123855	TESTING (10N) PRODUCT
S4	0	S1 (S) S2 (S) S3
S5	21	S1 (S) S2
S6	4	S5 AND S3

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Set	Items	Description
S1	9592	ENVIRONMENT?? (10N) (MOCK OR SIMULATED OR SIMULATING OR IM-ITAT?)
S2	135474	CONSUMER (10N) (SEARCH OR RESEARCH)
S3	123855	TESTING (10N) PRODUCT
S4	0	S1 (S) S2 (S) S3
S5	21	S1 (S) S2
S6	4	S5 AND S3

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S2	135474	CONSUMER (10N) (SEARCH OR RESEARCH)
S3	123855	TESTING (10N) PRODUCT
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S6	4	S5 AND S3

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TD 038

Set	Items	Description
S1	9592	ENVIRONMENT?? (10N) (MOCK OR SIMULATED OR SIMULATING OR IM-ITAT?)
S2	135474	CONSUMER (10N) (SEARCH OR RESEARCH)
S3	123855	TESTING (10N) PRODUCT
S4	0	S1 (S) S2 (S) S3
S5	21	S1 (S) S2
S6	4	S5 AND S3
S7	2542665	FACILITY
S8	1236	S1 AND S7
S9	16	S8 AND S2 — 16, 1, 3, 8
S10	1	S9 AND S3
S11	4	S5 AND S7
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Inventor

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- ③ NFlexity

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	(c) 2003 McGraw-Hill Co. Inc	
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	(c) 2003 The New York Times	
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S1	5	AU=(BERNING, C? OR BERNING C?)
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1/6,K/1 (Item 1 from file: 15)  
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00054327 77-06676  
**WHAT ABOUT DISPOSITION**  
APR. 1977

... BERNING, CAROL K

1/6,K/2 (Item 2 from file: 15)  
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00038025 76-03816  
**TIME AND CONSUMER BEHAVIOR - AN INTERDISCIPLINARY OVERVIEW**  
MARCH 1976

... BERNING, CAROL K.

1/6,K/3 (Item 3 from file: 15)  
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00020233 74-08939  
**PATTERNS OF INFORMATION ACQUISITION IN NEW PRODUCT PURCHASES**  
SEPT. 1974

BERNING, CAROL A. KOHN ...

1/6,K/4 (Item 1 from file: 2)  
DIALOG(R)File 2:(c) 2003 Institution of Electrical Engineers. All rts. reserv.

02780109 INSPEC Abstract Number: A87002321  
**Title: An AES and LEED study of the segregation of S to the surface of a Cu-5.8 at.% Al crystal**  
Publication Date: Aug. 1986

Author(s): Berning, C.L.P. ; Coleman, W.J.

1/6,K/5 (Item 1 from file: 35)  
DIALOG(R)File 35:(c) 2003 ProQuest Info&Learning. All rts. reserv.

782548 ORDER NO: AAD82-15985  
**THE RELATIONSHIP OF MAJOR CURRICULUM REVISION AND JOB ENRICHMENT IN SELECTED NATIONAL LEAGUE FOR NURSING BACCALAUREATE PROGRAMS**  
Year: 1982

Author: BERNING, CAROL A.

?t sl/9,k/1-3

1/9,K/1 (Item 1 from file: 15)  
DIALOG(R)File 15:ABI/Inform(R)  
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00054327 77-06676

**WHAT ABOUT DISPOSITION**

JACOBY, JACOB; **BERNING, CAROL K.** ; ET AL  
JOURNAL OF MARKETING V41 N2 PP: 22-28 APR. 1977 CODEN: JMKTAK ISSN:  
0022-2429 JRNL CODE: JMK  
DOC TYPE: Journal article LANGUAGE: English

ABSTRACT: WHEN A CONSUMER CONTEMPLATES DISPOSITION OF A PRODUCT, HE CAN CHOOSE TO KEEP THE PRODUCT, PERMANENTLY DISPOSE OF IT, TEMPORARILY DISPOSE OF IT OR VARIATIONS OF THESE CHOICES. THIS STUDY WAS CONDUCTED TO COLLECT DISPOSITION INTENTIONS DATA FROM RESPONDENTS. FINDINGS INCLUDED DATA RELEVANT TO THE QUESTION OF WHY PEOPLE ACQUIRE NEW PRODUCTS WHEN THE OLD ONES THEY POSSESS STILL PERFORM SATISFACTORILY. RESPONSES INCLUDED RECEIVING THE NEW ITEM AS A GIFT AND PURCHASING A NEW PRODUCT BECAUSE IT HAS NEWER FEATURES. FACTORS INFLUENCING THE DISPOSITION CHOICE THE CONSUMER MAKES ARE - 1. PSYCHOLOGICAL CHARACTERISTICS OF THE DECISION MAKER, I.E. PERSONALITY, ETC., 2. FACTORS INTRINSIC TO THE PRODUCT SUCH AS CONDITION, AGE, ETC., AND 3. SITUATIONAL FACTORS EXTRINSIC TO THE PRODUCT, I.E. FINANCES, STORAGE SPACE AND FASHION CHANGES. GRAPHS.

DESCRIPTORS: Market research; Product life cycle; Consumer behavior  
CLASSIFICATION CODES: 7100 (CN=Market research)

... **BERNING, CAROL K**



1/9,K/2 (Item 2 from file: 15)

DIALOG(R) File 15:ABI/Inform(R)

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00038025 76-03816

**TIME AND CONSUMER BEHAVIOR - AN INTERDISCIPLINARY OVERVIEW**

JACOBY, JACOB; SZYBILLO, GEORGE J.; **BERNING, CAROL K.**

JOURNAL OF CONSUMER RESEARCH V2 N4 PP: 320-339 MARCH 1976 CODEN: JCSRBJ

ISSN: 0093-5301 JRNL CODE: JCR

DOC TYPE: Journal article LANGUAGE: English

ABSTRACT: CONSUMER BEHAVIOR IS GENERALLY ACCEPTED TO BE THE ACQUISITION AND USE OF GOODS AND SERVICES, YET INTEGRALLY INVOLVED IN SUCH BEHAVIOR IS THE USE AND EXPENDITURE OF TIME. NOT ONLY DO CONSUMERS SPEND TIME AND MONEY WHEN ACQUIRING PRODUCTS, BUT THEY ALSO USE TIME AS A SUBSTITUTE FOR MONEY. IT IS NECESSARY THEREFORE, FOR RESEARCHERS TO EXAMINE THE RELATIONSHIPS BETWEEN TIME AND CONSUMER BEHAVIOR WITH REGARD TO ECONOMICS, SOCIOLOGY, HOME ECONOMICS, PSYCHOLOGY AND MARKETING. SECONDLY, A RUDIMENTARY TERMINOLOGY FOR SUCH EXPLORATION MUST BE CONCEPTUALIZED. IN ORDER TO ACCOMPLISH THIS, THREE BASIC ASSUMPTIONS MUST BE MADE, 1. TIME EXISTS IN LIMITED AND FINITE QUANTITIES - THUS IT IS OF VALUE. 2. TIME IS INTANGIBLE, IS FOREVER BEING EXPENDED, CANNOT BE STORED AND CAN BE ACQUIRED THROUGH TRADING RESOURCES SUCH AS MONEY OR EFFORT. 3. TIME HAS CAUSE-AND-EFFECT PROPERTIES. THUS IT CAN BE AN ANTECEDENT, A CONSEQUENCE OR BOTH. CHARTS.

DESCRIPTORS: Consumer behavior; Time management; Consumer; Research

CLASSIFICATION CODES: 7100 (CN=Market research)

... **BERNING, CAROL K.**

1/9,K/3 (Item 3 from file: 15)  
DIALOG(R) File 15:ABI/Inform(R)  
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00020233 74-08939

**PATTERNS OF INFORMATION ACQUISITION IN NEW PRODUCT PURCHASES**

**BERNING, CAROL A. KOHN ; JACOBY, JACOB**

JOURNAL OF CONSUMER RESEARCH V 1 N 2 PP: 18-22 SEPT. 1974 CODEN: JCSRBJ

ISSN: 0093-5301 JRNL CODE: JCR

DOC TYPE: Journal article LANGUAGE: English

ABSTRACT: WHILE CONSUMER-BEHAVIOR IS NOW ROUTINELY CONCEPTUALIZED AND DISCUSSED IN TERMS OF A DECISION PROCESS APPROACH, RESEARCH METHODOLOGIES APPROPRIATE FOR INVESTIGATING DYNAMIC PROCESSES ARE NOT GENERALLY UTILIZED. IN CONTRAST, THE METHODOLOGY OF THIS STUDY ENABLES THE DECISION-MAKING PROCESS TO BE RECORDED AS AN ONGOING, DYNAMIC EVENT. USING A PROCESS METHODOLOGY TO EXAMINE INFORMATION ACQUISITION BEHAVIOR RELATED TO FIVE NEW PRODUCTS, IT WAS FOUND THAT SIGNIFICANT DIFFERENCES EXISTED BETWEEN THE AMOUNT OF INFORMATION REQUESTED FROM THE 'FRIEND' SOURCE BY INNOVATORS ABOUT NEW PRODUCTS. ADDITIONALLY, PERSONAL INFORMATION SOURCES WERE CONSULTED AFTER IMPERSONAL SOURCES. THROUGH EXAMINATION OF FIVE TYPES OF INFORMATION -- ACTUAL ADS FROM PRINT MEDIA, PRICE, ACTUAL PACKAGE INFORMATION, COMMENTS ATTRIBUTED TO 'FRIENDS,' AND COMMENTS ATTRIBUTED TO SALES PERSONNEL -- IT APPEARS THAT THE DECISION-MAKING PROCESS PRECEDING PURCHASE OF AN INNOVATION DIFFERS IN THE SEARCH OF INFORMATION FROM FRIENDS. TABLE.

DESCRIPTORS: Consumer behavior; Decision making; New; Products

CLASSIFICATION CODES: 7100 (CN=Market research)

**BERNING, CAROL A. KOHN ...**

?

particular processes or materials. Our focus is on the **consumer**, based on full product and market **research**. We call it: `display intelligence.'

KMD COMPANY LTD  
140 Queens Road,  
Leicester, LE2 3FX.

T...over 16 years experience, do all of the above and more. Full in-house CAD **facility** offering creative economic solutions in:  
CORRUGATED-DISPLAY BOARD-BOXBOARD & RIGID PVC  
Competitive prices and on...

9/6,K/13 (Item 5 from file: 148)

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15010085 SUPPLIER NUMBER: 92028512 (USE FORMAT 7 OR 9 FOR FULL TEXT)

**Industry directory.(Directory)**

Sept, 2002

WORD COUNT: 2585 LINE COUNT: 00650

... co.uk

Contact: Dennis Briggs/  
Peter Podmore

We operate probably the best laser cut Acrylic **facility** in Europe, possibly the world. We use three 2500x1800x30mm capacity "Eurolaser", machines delivering ...digital printing, cutting, creasing, embossing and gluing (even onto polypropylene) facilities in our clean production **environment**, let Burall Plas Tec meet your packaging requirements.

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**MOCK** -UPS

FINISH CREATIVE SERVICES LTD  
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London, EC1V 0AP  
T: 020 7251...marketing, without the usual restrictions on particular processes or materials. Our focus is on the **consumer**, based on full product and market **research**. We call it: `display intelligence.'

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T...

9/6,K/14 (Item 6 from file: 148)

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12144383 SUPPLIER NUMBER: 61623312 (USE FORMAT 7 OR 9 FOR FULL TEXT)

**Making survey-based price experiments more accurate.**

April, 1999

WORD COUNT: 2617 LINE COUNT: 00223

... approached in the main concourse of a large shopping mall, and taken to a central **facility** to complete the survey. Each respondent was asked to make successive choices between four brands...Australia Malcolm Wright is a Senior Research Associate at the University of South Australia.

His **research** interests revolve around survey **research**, modelling aggregate **consumer** behaviour and empirical generalisations in marketing. He has published in a variety of European and...

...non-experimental data.

References

BURKE, R., HARLAM, B., KAHN, B. & LODISH, L. (1992). Comparing dynamic **consumer** choice in real and computer- **simulated environments**. Journal of **Consumer Research**, 19, June, pp. 71-82.

EHRENBERG, A. & SCRIVEN, J. (1998). Extracts from the R&DI...

...making. 2nd Edition. Englewood Cliffs, NJ: Prentice Hall.

NEVIN, J. (1974). Laboratory experiments for estimating **consumer** demand: a validation study. Journal of Marketing **Research**, 11, August, pp. 261-268.

SIMON, H. (1989). Price management. Amsterdam: Elsevier Science Publishers.

STOUT...

9/6,K/15 (Item 7 from file: 148)

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11772533 SUPPLIER NUMBER: 58065166 (USE FORMAT 7 OR 9 FOR FULL TEXT)  
**The Selection and Pricing of Retail Assortments: An Empirical Approach.**  
Fall, 1999

WORD COUNT: 9003 LINE COUNT: 00929

... frequently purchased, low-involvement, or impulse items. However, this is an issue appropriate to future **research**. The choice rules used to model **consumer** decisions would need to be explored carefully because although Rule 1 proved best in our...176.

Bucklin, Randolph E. and V. Srinivasan. (1991). "Determining Interbrand Substitutability Through Survey Measurement of **Consumer** Preference Structures," Journal of Marketing **Research**, 27 (February): 58-71.

Bultez, Alain and Philippe Naert. (1988). "S.H.A.R.P....

...Raymond R., Bari A. Harlam, Barbara E. Kahn, and Leonard M. Lodish. (1992). "Comparing Dynamic **Consumer** Choice in Real and Computer- **simulated Environments**," Journal of **Consumer Research**, 19 (June): 71-82.

Carpenter, Gregory S., and Donald R. Lehmann. (1985). "A Model of...  
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9/6,K/16 (Item 8 from file: 148)

DIALOG(R)File 148:(c)2003 The Gale Group. All rts. reserv.

04500298 SUPPLIER NUMBER: 08295421 (USE FORMAT 7 OR 9 FOR FULL TEXT)  
**Rubbermaid gets a handle on mops and brooms. (Rubbermaid Inc.)**  
Jan 15, 1990

WORD COUNT: 1399 LINE COUNT: 00109

... Birutis, product manager, and Porter Kauffman, national sales manager, has spent three years conducting extensive **consumer** and retail **research** and gathering statistics and other data on markets, programs,

products, features and colors.

Based on...

...in North America.

While manufacturing plants are scattered, the company has centralized distribution, using one **facility** in Statesville, N.C. "We have chosen to centralize this product in order to respond...on.

The same attention has been paid to packaging. Rubbermaid actually took consumers through a **simulated** store **environment** to determine how long they look at a planogram, what they look at and how...  
?

... co.uk

Contact: Dennis Briggs/  
Peter Podmore

We operate probably the best laser  
cut Acrylic **facility** in Europe,  
possibly the world. We use three  
2500x1800x30mm capacity  
"Eurolaser", ...digital printing, cutting,  
creasing, embossing and gluing  
(even onto polypropylene) facilities  
in our clean production **environment** ,  
let Burall Plas Tec meet your  
packaging requirements.

PACKAGING  
**MOCK** -UPS

FINISH CREATIVE SERVICES LTD  
37-42 Compton Street,  
London,  
EC1V 0AP.

T: 020 7251...marketing, without the usual  
restrictions on particular processes  
or materials. Our focus is on the  
**consumer** , based on full product  
and market **research** . We call it:  
'display intelligence.'

KMD COMPANY LTD  
140 Queens Road,  
Leicester, LE2 3FX.  
T...over 16 years experience, do all  
of the above and more. Full in-house  
CAD **facility** offering creative  
economic solutions in:

CORRUGATED-DISPLAY BOARD BOXBOARD  
& RIGID PVC

Competitive prices and on time...

9/6,K/11 (Item 3 from file: 148)

DIALOG(R) File 148:(c)2003 The Gale Group. All rts. reserv.

15642759 SUPPLIER NUMBER: 96695074 (USE FORMAT 7 OR 9 FOR FULL TEXT)

**Industry directory.(display companies) (Directory)**

Jan, 2003

WORD COUNT: 2549 LINE COUNT: 00652

... co.uk

Contact: Dennis Briggs/  
Peter Podmore

We operate probably the best laser  
cut Acrylic **facility** in Europe,  
possibly the world. We use three  
2500x1800x30mm ...digital printing, cutting,  
creasing, embossing and gluing  
(even onto polypropylene) facilities  
in our clean production **environment** ,  
let Burall Plas Tec meet your  
packaging requirements.

PACKAGING  
MOCK -UPS

FINISH CREATIVE SERVICES LTD  
37-42 Compton Street,  
London,  
EC1V 0AP.  
T: 020 7251...and  
sales@posiform.biz  
Contact: Leigh Smith, Bradley  
Varnam, Jim Hawley

35,000 square foot **facility** , in-house  
facilities include:

\* Injection Moulding (from 65 to  
630 tonnes)

\* Vacuum forming (up to...marketing, without the usual  
restrictions on particular processes  
or materials. Our focus is on the  
**consumer** , based on full product  
and market **research** . We call it:  
'display intelligence.'

KMD COMPANY LTD  
140 Queens Road,  
Leicester,  
LE2 3FX.  
T...over 16 years experience, do all  
of the above and more. Full in-house  
CAD **facility** offering creative  
economic solutions in:

CORRUGATED-DISPLAY BOARD-BOXBOARD  
& RIGID PVC

Competitive prices and on...

9/6,K/12 (Item 4 from file: 148)  
DIALOG(R) File 148:(c)2003 The Gale Group. All rts. reserv.

15637243 SUPPLIER NUMBER: 99147062 (USE FORMAT 7 OR 9 FOR FULL TEXT)  
**Industry directory.(marketing industry)(Directory)**  
Feb, 2003  
WORD COUNT: 5859 LINE COUNT: 00667

... co.uk

Contact: Dennis Briggs/  
Peter Podmore

We operate probably the best laser cut Acrylic **facility** in Europe,  
possibly the world. We use three 2500x1800x30mm ...digital printing,  
cutting, creasing, embossing and gluing (even onto polypropylene)  
facilities in our clean production **environment** , let Burall Plas Tec meet  
your packaging requirements.

PACKAGING **MOCK** -UPS  
FINISH CREATIVE SERVICES LTD  
37-42 Compton Street,  
London, EC1V 0AP.  
T: 020 7251...and  
sales@posiform.biz  
Contact: Leigh Smith, Bradley  
Varnam, Jim Hawley

35,000 square foot **facility** , in-house facilities include:  
\* Injection ...marketing, without the usual restrictions on

9/6,K/1 (Item 1 from file: 15)

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02349073 115342445

\*\*USE FORMAT 9 FOR FULL TEXT\*\*

**The influence of multiple store environment cues on perceived merchandise value and patronage intentions**

Apr 2002 LENGTH: 22 Pages

WORD COUNT: 12227

...TEXT: of Barker's (1965) theory of behavioral ecology, when the number of people in a **facility** is less than the setting requires to function properly, a condition identified in sociology as...S. city. Subjects viewed a five-minute videotape that visually "walked" them through the store **environment**, **simulating** a shopping or browsing experience. They then completed a questionnaire that contained items to measure...issues in the following sections.

#### Limitations

As is usually the case with studies conducted in **simulated environments**, our research has some shortcomings. Videotaped scenarios, though more experiential and realistic than written scenarios...

... In case respondents deliberately look for cues because they know they are reacting to a **simulated environment**, a balanced scenario will offer similar opportunities for the various cues to be noticed.

Different... its strengths compared with previous studies, is the examination of consumers' reactions to multiple store **environment** cues presented simultaneously in as realistic a **simulated environment** as was allowed by the videotaping technology we used. As such, the differential effects our...on Shopping Behavior: Classical Versus Top-- Forty Music in a Wine Store," in Advances in **Consumer Research**, Leigh McAlister and Michael L. Rothchild, eds. Provo, UT: Association for **Consumer Research**, 336-40.

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Baumgarten, Steven A. and James S. Hensel (1987), "Enhancing the Perceived ... Siomkos (1985), "Toward a Methodology for Assessing Effects of In-Store Atmospherics:' in Advances in **Consumer Research**, Richard Lutz, ed. Chicago: Association for **Consumer Research**, 27-31.

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... and Behavior: Modeling the Impact of Designed Space," The International Review of Retail, Distribution and **Consumer Research**, 4 (January), 1-16.

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... Lutz, Kathy A. and Richard J. Lutz (1978), "Imagery-Eliciting  
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Macinnis, Deborah J. and C. Whan Park (1991), "The Differential Role of  
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... 1992), "The Value of Time in Price Comparison Shopping: Survey and  
Experimental Evidence:' Journal of **Consumer Research**, 19 (June), 52-61.

Mazursky, David and Jacob Jacoby (1986), "Exploring the Development of  
Store...Science, 4 (Summer), 199-214.

-iUS, rW up A. and Peter 13. bverett (199.)), -ne **Consumer Retail Search**  
Process: A Conceptual Model and **Research** Agenda; Journal of the Academy  
of Marketing Science, 23 (2), 106-19.

Voss, Glenn B...

...Marketing Science, 25 (Spring), 139-53.

Zeithaml, Valarie A. (1984), "Issues in Conceptualizing and Measuring  
**Consumer Response to Price**," in Advances in **Consumer Research**, Vol.  
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, 612-16.

( tvu), W onsumer Perceptions of Price, Quality, and Value: A Means-End  
Model...

9/6,K/2 (Item 2 from file: 15)  
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01840688 04-91679

\*\*USE FORMAT 9 FOR FULL TEXT\*\*

**The impact of health claims on consumer search and product evaluation  
outcomes: Results from FDA experimental data**  
Spring 1999 LENGTH: 17 Pages  
WORD COUNT: 10774

**The impact of health claims on consumer search and product evaluation  
outcomes: Results from FDA experimental data**

ABSTRACT: Results of a mall-intercept study regarding the effects of health  
claims on **consumer information search** and processing behavior are  
reported. Results suggest that the presence of health and nutrient-content  
...

...TEXT: authors report results of a mall-intercept study regarding the  
effects of health claims on **consumer information search** and processing  
behavior. Results suggest that the presence of health and nutrient-content  
claims on... the debate regarding health claims by trying to isolate the  
effects of health claims on **consumer informationprocessing** strategies in  
an experimental format. Because our **research** follows their approach  
closely and builds on some of their findings, we discuss their approach...

product judgment and assessment associated with different degrees of information processing performed. That is, if **search** is truncated, there may be measurable differences in the **consumer**'s evaluation of the product. This leads us to hypothesize the following:

H sub 2...

... Drug Administration about how people use food label information." Respondents were brought to a central **facility** for a face-to-face interview. Each respondent was assigned randomly to a sequence of...because of the differential effect that claims produced for different products.

Similar to other experimental **research** focused on **consumer** behavior, our study is limited by the artificial nature of the tasks and the information... the items purchased in this category change? Would greater cognitive effort be needed by the **consumer** to maintain the same level of nutrition? **Research** that studies these difficult questions would help us better understand the role that health claims...

... actions can affect perceived credibility presents yet another difficult challenge for assessing these issues.

Our **research** also is limited because it only investigates effects on the **consumer** side of the market. Potential supplyside effects surrounding health claims regulation, including dynamic effects on...Raymond R., Bari A. Harlam, Barbara E. Kahn, and Leonard M. Lodish (1992), "Comparing Dynamic **Consumer** Choice in Real and Computer- **Simulated Environments**," **Journal of Consumer Research**, 19 (June), 71-82. Calfee, John E. and Debra Jones Ringold (1988), "Consumer Skepticism and Advertising Regulation: What Do the Polls Show?" **Advances in Consumer Research**, 15, 244-48. Cole, Catherine A. and Siva K. Balasubramanian (1993), "Age Differences in Consumers' **Search** for Information: Public Policy Implications," **Journal of Consumer Research**, 20 (June), 157-69.

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...Management, 15 (Spring), 28-44.

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Muller, Thomas E. (1985), "Structural Information Factors Which Stimulate the Use of Nutrition Information: Field Experiment," Journal of Marketing **Research**, 22 (May), 30-42. Newman, John W. (1977), "**Consumer** External **Search**: Amount and Determinants," in **Consumer** and Industrial Buying Behavior, Arch Woodside et al., eds. New York: Elsevier, 79-84. Payne, John W. (1976), "Heuristic **Search** Processes in Decision Making," in Advances in **Consumer Research**, Vol. 3, B.B. Anderson, ed. Provo, UT: Association for **Consumer Research**, 321-27.

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... Gary J. Russell, and Barbara L. Metcalf (1986), "Nutrition Information in the Supermarket," Journal of **Consumer Research**, 13 (June), 48-70.

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9/6,K/3 (Item 3 from file: 15)

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01657584 03-08574

\*\*USE FORMAT 9 FOR FULL TEXT\*\*

**Alternative indexes for monitoring customer perceptions of service quality:  
A comparative evaluation in a retail context**

Summer 1998 LENGTH: 13 Pages

WORD COUNT: 9239

...TEXT: performance measures. The article concludes with a discussion of the findings and implications for future **research**.

Measures of customer satisfaction and service quality obtained through **consumer** surveys have become a widely used barometer of business performance over the past decade. For... items load on three clearly interpretable facets of the stores' service quality: cleanliness of the **facility** (Factor 1), food quality (Factor 2), and employee responsiveness (Factor 3). These three factors in... This method of establishing validity is consistent with other approaches that have been used in **consumer** satisfaction **research** (Fornell et al. 1996; Johnson et al. 1995).

This study used year-to-year changes... the effects of noise in the link between service quality and shopping behavior in the **simulated** retail **environment**. Such noise could occur in real life because of factors such

as competitive promotions, seasonal...to choose a strategy of minimizing customer alienation. If a firm confirmed this relationship through **consumer research**, it may want to monitor customer dissatisfaction and allocate its resources to reduce incidents that...Drew. 1991. "A Multistage Model of Customers' Assessments of Service Quality and Value." *Journal of Consumer Research* 17 (March): 375-384.

Buzzell, Robert D. and Bradley T. Gale. 1987. *The PIMS Principles...*

...JAI, 167.

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1996. "The American Customer Satisfaction Index: The National Measure of Quality." In...

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Kaare, James 1996. "Perceived Value, Client Satisfaction and Profitability." In *Proceeding*...68-72.

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Woodruff, Robert B., Ernest R. Cadotte, and Roger L. Jenkins. 1983. "Modeling **Consumer** Satisfaction Processes Using Experience-Based Norms." *Journal of Marketing Research* 20 (3):296-304. Zahorik, Anthony J., and Roland T. Rust. 1992. "Modeling the Impact..."

... his M.B.A. from McGill University and his Ph.D. from Columbia University. His **research** has been published in the *Journal of Consumer Satisfaction, Dissatisfaction and Complaining Behavior*, *Pricing Strategy and Practice*, *Middle East Insight*, *Advances in Consumer Research*, the *Journal of Professional Services Marketing*, and the *Journal of Business in Developing Nations*.

9/6,K/4 (Item 4 from file: 15)  
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01509239 01-60227

\*\*USE FORMAT 9 FOR FULL TEXT\*\*

**Exploring the implications of the Internet for consumer marketing**

Fall 1997 LENGTH: 18 Pages

WORD COUNT: 11189

...TEXT: and sundries. Consumers shopped by means of computertype consoles linked electronically to a central distribution **facility** that employed, among other things, electronic funds transfer to control costs. Automated order filling of...not equal on the Internet.) By indicating a brand choice at the beginning of the **search** process, the **consumer** forces retailers that stock the brand to compete on price by comparing their offerings across...

...either the Internet or a conventional retail channel.

Figure 3C presents the scenario of a **consumer** delaying a brand choice until completing a **search** of both the Internet and conventional retail channels. In this instance, the consumer possesses all...are organized around the themes of consumers, retailers, manufacturers, other channel intermediaries, and social planning.

**Consumer** -Oriented Questions

How will the availability of automated **search** and information presentation mechanisms on the Internet affect the way consumers search for information and...between similar retailers in an Internet mall?

The Internet facilitates the collection of information on **consumer** characteristics and **search** processes. How should such information be collected and used? What are the privacy issues involved...

... pp. Al, A8. Beales, Howard, Michael B. Mazis, Steven C. Salop, and Richard Staelin. 1981. "**Consumer Search** and Public Policy." **Journal of Consumer Research** 8 (June): 11-22.

Benjamin, Robert and Rolf Wigand. 1995. "Electronic Markets and Virtual Value... 120-131. , Bari A. Harlam, Barbara E. Kahn, and Leonard M. Lodish. 1992. "Comparing Dynamic **Consumer Choice** in Real and Computer-Simulated Environments ." **Journal of Consumer Research** 19 (June): 71-82. Choi, S. Chan. 1991. "Price Competition in a Channel Structure With ... Bell Journal of Economics 14 (Spring): 275-282. Zettelmeyer, Florian. 1996. "The Strategic Use of **Consumer Search Cost**." Working Paper, William E. Simon Graduate School of Business Administration, University of Rochester, NY...

... Bronnenberg is an assistant professor of marketing at the University of Texas at Austin. His **research** interests are psychological models of economic behavior, **consumer** choice and choice protocols, and advertising. His work has been published in the Journal of...

9/6,K/5 (Item 5 from file: 15)  
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01307141 99-56537

**\*\*USE FORMAT 9 FOR FULL TEXT\*\***

**The effects of the service environment on affect and consumer perception of waiting time: An integrative review and research propositions**  
Fall 1996 LENGTH: 12 Pages  
WORD COUNT: 9502

**The effects of the service environment on affect and consumer perception of waiting time: An integrative review and research propositions**

...ABSTRACT: influence affect and time perception are presented. Finally, a research agenda and implications for service **facility** design are proposed. ...

...TEXT: influence affect and time perception are presented. Finally, a research agenda and implications for service **facility** design are proposed.

Customers frequently overestimate the amount of time they spend waiting in line...

... often produced, delivered, and consumed during a single encounter occurring within the service firm's **facility** . In addition, because services cannot be inventoried and demand may be hard to predict (Zeithaml ...

... propositions offer guidance for future research on waiting time perception and to managers making service **facility** design decisions.

#### A MODEL OF THE SUBJECTIVE WAIT EXPERIENCE

Bitner (1992) proposed that the service...access to a naturally occurring experiment and does not have the resources to construct actual **environments** , other methods are available. Several forms of **simulated environments** such as photos, slides, scale models, and videotapes have

been used in experimental studies (e...

... on-site evaluations (e.g., Hersberger and Cass 1974). Because subjects cannot actually "wait" in **simulated environments**, researchers could use a scenario approach in conjunction with this method to explore some of... what music is liked).

There are many important considerations in choosing colors for a service **facility**, but managers need to be sensitive about how colors might influence customers'

perceptions of waiting...S., Susan Koletsky, and John L. Graham. 1987. "A Field Study of Causal Inferences and **Consumer** Reaction: The View From the Airport" **Journal of Consumer Research** 13 (March): 534-539. Gardner, Meryl Paula. 1985. "Mood States and **Consumer** Behavior." **Journal of Consumer Research** 12 (December): 281-300.

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Goldstone, S., W. I. Lahmon, and J. Sechzer. 1978. "Light...Jacob. 1984. "Subjective vs. Objective Time Measures: A Note on the Perception of Time in **Consumer** Behavior." **Journal of Consumer Research** 11 (June): 615-618...

... K. and John E. G. Bateson. 1991. "Perceived Control and the Effects of Crowding and **Consumer** Choice on the Service Experience." **Journal of Consumer Research** 18 (September): 174-184. and David K. Tse. 1996. "What to Tell Customers in Waits..."

... More Than 24 Hours a Day: A Preliminary Investigation of Polychronic Time Use **Journal of Consumer Research** 18 (December): 392-401. Kellaris, James J. and Moses B. Altesch. 1992. "The Experience of Time as a Function of Musical Loudness and Gender of Listener." In **Advances in Consumer Research**. Vol. 19. Eds. J. Sherry and B. Sternthal. Provo, UT: Association for **Consumer Research**, 725-729... Mantel. 1994. "The Influence of Mood and Gender on Consumers' Time Perceptions." In **Advances in Consumer Research**. Vol. 20. Eds. C. Allen and D. Roedder-John. Provo, UT: Association for **Consumer Research**, 514-518...

... E. 1986. "The Influence of Background Music on the Behavior of Restaurant Patrons." **Journal of Consumer Research** 13 (September): 286-289.

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National Aeronautics and Space Administration, Johnson Spacecraft Center. 1976. "The..."

9/6,K/6 (Item 6 from file: 15)

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01151933 98-01328

\*\*USE FORMAT 9 FOR FULL TEXT\*\*

**Increasing environmental sensitivity via workplace experiences**

Fall 1995 LENGTH: 11 Pages

WORD COUNT: 8297

...TEXT: successful waste management program (EXPERIENCE group) and 400 questionnaires to employees in a slightly larger **facility** that had not introduced the program (NO EXPERIENCE group). To understand the influence of successful... several implications for action and avenues for further exploration.

The results indicate that consumers consider **environmental** attributes when making **simulated** brand choices. Even at a general level there are indications that the public is including...Environmental Attitudes and Consumer Product Usage: Measuring the Role of Attitude Strength," in

Advances in **Consumer Research**, Vol. 20, Leigh McAlister and Michael Rothschild, eds. Provo, UT: Association for **Consumer Research**, 189-94.

Antil, John H., (1984), "Socially Responsible Consumers: Profile and Implications for Public Policy...

...Berger, Ida E. (1993), "The Relationship Between Environmental Attitudes and Behaviour," Canadian Journal of Marketing **Research**, 12, 36-43.

-- and Ruth M. Corbin (1992), "Perceived **Consumer** Effectiveness and Faith in Others as Moderators of Environmentally Responsible Behaviors," Journal of Public Policy...

... Effect Of Advertising On Attitude Accessibility. Attitude Confidence, and the Attitude-Behavior Relationship," Journal of **Consumer Research**, 16 (December), 269-79.

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... Green, Paul E. (1974), "On the Design of Choice Experiments Involving Multifactor Alternatives," Journal of **Consumer Research**, 1 (September), 61-68.

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Henion, Karl E., Russell Gregory, and Mona A. Clee (1981) "TradeOffs...

... Attribute Levels Made by Ecologically Concerned and Unconcerned Consumers When Buying Detergents," in Advances in **Consumer Research**, Vol. 8, Kent B. Monroe, ed. Provo, UT: Association for **Consumer Research**, 624-29.

Kirk, Roger E. (1982), Experimental Design: Procedures for the Behavioral Sciences. Belmont, CA...

9/6,K/7 (Item 7 from file: 15)

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01099089 97-48483

**\*\*USE FORMAT 9 FOR FULL TEXT\*\***

**Entry strategy and long-term performance: Conceptualization and empirical examination**

Oct 1995 LENGTH: 16 Pages

WORD COUNT: 10574

...TEXT: look at an integrative entry strategy of a product into a market, albeit in a **simulated** Markstrat **environment**, and examine the component parts of an implemented entry strategy. In addition, they apply causal... research, these inherent firm characteristics encompass (1) superior resources (e.g., scale of a manufacturing **facility**, family brand names), which are more tangible requirements for advantage that enable a firm to... Research, 25 (February), 87-94.

-- and Claes Fornell (1985), "Sources of Market Pioneer Advantages in **Consumer Goods Industries**," Journal of Marketing **Research**, 22 (August), 305-17.

--, Gurumurthy Kalyanram, and Glen L. Urban (1994), "First-Mover Advantages from...

9/6,K/8 (Item 8 from file: 15)

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00725804 93-75025

\*\*USE FORMAT 9 FOR FULL TEXT\*\*

**Servicescapes: The Impact of Physical Surroundings on Customers and Employees**

Apr 1992 LENGTH: 15 Pages

WORD COUNT: 10487

...TEXT: frequently the impact of a specific design or design change on ultimate users of the **facility** is not fully understood.

The ability of the physical environment to influence behaviors and to...

... consumer is "in the factory," often experiencing the total service within the firm's physical **facility**. The factory (or the place where the service is produced) cannot be hidden and may...

... direct human contact, customers and employees interact with each other within the organization's physical **facility**. Ideally, therefore, the organization's environment should support the needs and preferences of both service...

... important in service settings because customers as well as employees often experience the firm's **facility**. However, not all service firms and industries are alike (Lovelock 1983; Schmenner 1986), nor do...its many floors, rooms, sophisticated equipment, and complex variability in functions performed within the physical **facility**. In such an elaborate environment, the full range of marketing and organizational objectives theoretically can...Examples are again abundant in actual service settings. Even casual observation of a Club Med **facility** confirms that the highly complex setting is designed to encourage social interaction among and between...

... employee behaviors and the strategic goals that the organization hopes to advance through its physical **facility**. For example, in designing their corporate headquarters offices, Scandinavian Airline Systems first identified particular goals...Ward 1990; Mervis and Rosch 1981). Similarly, the overall perception of the servicescape enables the **consumer** or employee to categorize the firm mentally. For example, **research** shows that in the restaurant industry a particular configuration of environmental cues suggests "fast food...beliefs, emotions, and physiological responses will encourage patients to get up and walk around the **facility** if that is a desired behavior for their recovery?

Because elaborate services (e.g., banks... who spend long hours in the environment.

A very limited number of empirical studies in **consumer research** confirm that ambient factors may influence customer responses. For example, in studies of restaurants and...

... in a particular servicescape. For example, changes in the layout and furnishings of the service **facility** can be made to speed the flow of transactions, encourage particular forms of interaction between... management is a separate function performed by persons with titles such as "environmental space manager," " **facility** planner," and " **facility** manager" (Becker 1981; Davis and Sziget 1982). In many organizations, environmental decisions are made routinely...

... Figure 2) is the need for cross-functional cooperation in decision making about service environments. " **Facility** planning and management . . . is a problemsolving activity that lies on the boundaries between architecture, interior...

...behavior, planning and environmental psychology" (Becker 1981, p. 7). As such, decisions about the physical **facility** can have an impact on human resource goals (e.g., worker retention, worker productivity), operations...

...customers.



## RESEARCH IMPLICATIONS

The conceptual framework and the servicescape typology suggest a wide range of **research** possibilities. Given the scarcity of **research** reported in the **consumer** behavior and marketing literature, there is a tremendous opportunity for theory building, empirical testing, development...

... research. The propositions are purposefully general. Each one could be explored and expanded through empirical **research**. For example, given a specific commercial environment, how does a **consumer**'s (or employee's) purpose for being there affect the person's response to the...may be most appropriate in some cases--for example, in research on the effect of **facility** layout options on customer/employee interaction patterns. The application of direct observation methods has just...

... Such observations could be extremely detailed and useful in an applied sense in redesigning a **facility** or in comparing environments. For theory development, direct observation could be the source of additional...

... of design dimensions on consumers and employees. Because of the expense involved in constructing actual **environments**, some form of **simulated environment** (verbal descriptions, photos/slides, scale models, videos) could be used in experimental studies (see Bechtel, Marans, and Michelson 1987, ch. 5). The **environmental** psychology tradition has shown that **simulated environments** work well in achieving generalizable results (Nasar 1989). In designing experiments, the researcher should recall...

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**Servicescapes: The Impact of Physical Surroundings on Customers and Employees**

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**ABSTRACT:** A typology of service organizations is presented, and a conceptual framework is advanced for exploring the effect of physical surroundings on the behaviors of both customers and employees. It is shown that the physical environment may assume a variety of strategic roles in services marketing and management: 1. The servicescape provides a visual metaphor for an organization's total offering. 2. The servicescape can assume a facilitator role by either aiding or hindering the ability of customers and employees to carry out their respective activities. 3. The physical environment can serve as a differentiator in signaling the intended market segment, positioning the organization, and conveying distinctiveness from competitors. To secure strategy advantages from the servicescape, the needs of ultimate users and the requirements of various functional units must be incorporated into environmental design decisions.

**TEXT:** The effect of atmospherics, or physical design and decor elements, on consumers and workers is recognized by managers and mentioned in virtually all marketing, retailing, and organizational behavior texts. Yet, particularly in marketing, there is a surprising lack of empirical research or theoretically based frameworks addressing the role of physical surroundings in consumption settings. Managers continually plan, build, change, and control an organization's physical surroundings, but frequently the impact of a specific design or design change on ultimate users of the **facility** is not fully understood.

The ability of the physical environment to influence behaviors and to create an image is particularly apparent for service businesses such as hotels, restaurants, professional offices, banks, retail stores, and hospitals (Baker 1987; Bitner 1986; Booms and Bitner 1982; Kotler 1973; Shostack 1977; Upah and Fulton 1985; Zeithaml, Parasuraman, and Berry 1985). Because the service generally is produced and consumed simultaneously, the consumer is "in the factory," often experiencing the total service within the firm's physical **facility**. The factory (or the place where the service is produced) cannot be hidden and may in fact have a strong impact on customers' perceptions of the service experience. Even before purchase, consumers commonly look for cues about the firm's capabilities and quality (Berry and Clark 1986; Shostack 1977). The physical environment is rich in such cues (Rapoport 1982) and may be very influential in communicating the firm's image and purpose to its customers. Research suggests that the physical setting may also influence the customer's ultimate satisfaction with the service (Bitner 1990; Harrell, Hutt, and Anderson 1980).

Interestingly, in service organizations the same physical setting that communicates with and influences customers may affect employees of the firm (Baker, Berry, and Parasuraman 1988). Research in organizational behavior suggests that the physical setting can influence employee satisfaction, productivity, and motivation (e.g., Becker 1981; Davis 1984; Steele 1986; Sundstrom and Altman 1989; Sundstrom and Sundstrom 1986; Wineman 1986). The customer is left out of that research stream, however, just as the employee typically is ignored in the limited atmospherics research in marketing

(e.g., Donovan and Rossiter 1982; Kotler 1973; Milliman 1982, 1986). For example, in the Milliman experiments, music tempo was varied and the effect on a variety of consumer behaviors was measured; however, the effects on employee satisfaction and productivity were not explored. Because services generally are purchased and consumed simultaneously, and typically require direct human contact, customers and employees interact with each other within the organization's physical **facility**. Ideally, therefore, the organization's environment should support the needs and preferences of both service employees and customers simultaneously.

The purpose of this article is to take a first step toward integrating theories and empirical findings from diverse disciplines into a framework that describes how the built environment (i.e., the manmade, physical surroundings as opposed to the natural or social environment), or what is referred to here as the "servicescape," affects both consumers and employees in service organizations. First, a typology of service organizations is presented that illuminates important variations in form and usage of the servicescape. Next, a conceptual framework is offered for explaining environment-user relationships in service organizations, and specific research propositions are advanced. The framework is anchored in the environmental psychology research tradition and also draws together relevant literature in marketing, organizational behavior, human factors/ergonomics, and architecture. Finally, the linkages between the service organization typology and the framework are examined, and key managerial and research implications are discussed.

#### A TYPOLOGY OF SERVICESCAPES

"The way the physical setting is created in organizations has barely been tapped as a tangible organizational resource" (Becker 1981, p. 130). Management of the physical setting typically is viewed as tangential in comparison with other organizational variables that can motivate employees, such as pay scales, promotions, benefits, and supervisory relationships. Similarly, on the consumer side, variables such as pricing, advertising, added features, and special promotions are given much more attention than the physical setting as ways in which customers can be attracted to and/or satisfied by a firm's services. A clear implication of the model presented here is that the physical setting can aid or hinder the accomplishment of both internal organizational goals and external marketing goals.

As is true of any organizational or marketing variable, the importance of physical setting depends on the nature of the job and the nature of the consumption experience. The position advanced here is that the physical surroundings are, in general, more important in service settings because customers as well as employees often experience the firm's **facility**. However, not all service firms and industries are alike (Lovelock 1983; Schmenner 1986), nor do they face the same strategic issues in planning and designing their servicescapes. Figure 1 is a typology categorizing service organizations on two dimensions that capture important differences in the management of the servicescape. (Figure 1 omitted) Firms that share a cell within the matrix face similar issues related to the design of their physical spaces.

The vertical dimension relates to who is performing actions within the servicescape--the customer, or the employee, or both. One extreme is represented by the "self-service" organization in which few if any employees are present and the level of customer activity is high. At the other extreme is the "remote service" where there is little or no customer involvement in the servicescape and sometimes even little employee involvement, such as in fully automated voice-messaging services. Note from Figure 1 that "interpersonal services" are positioned between the two extremes. In those organizations, both customers and employees are present and performing actions within the servicescape. The relative level of involvement of customers and employees determines whose needs should be consulted in the design of the environment. In interpersonal servicescapes,

special consideration must be given to the effects of the physical environment on the nature and quality of the social interaction between and among customers and employees.

Whether customers, employees, or both are present within the servicescape also determines the types of objectives a firm might expect to accomplish through use of its physical environment. In self-service settings, the creative use of physical design could support particular positioning and segmentation strategies and enhance specific marketing objectives, such as customer satisfaction and attraction. At the other extreme, for remote services, organizational objectives such as employee satisfaction, motivation, and operational efficiency could be the primary goals in physical setting design, because few customers would ever see or experience the firm's physical setting. For interpersonal services, both organizational and marketing objectives could potentially be targeted through careful design of the servicescape. Even marketing goals such as relationship building (Crosby, Evans, and Cowles 1990) could be influenced by the design of the physical setting.

The horizontal dimension of Figure 1 captures the complexity of the servicescape. Some service environments are very simple, with few elements, few spaces, and few forms. They are termed "lean" environments. Ticketron outlets and Federal Express dropoff kiosks would qualify as lean environments, as both provide service from one simple structure. For lean servicescapes, design decisions are relatively straightforward, especially in self-service or remote service situations in which there is no interaction between customers and employees. Other servicescapes are very complicated, with many elements and many forms. They are termed "elaborate" environments. An example is a hospital with its many floors, rooms, sophisticated equipment, and complex variability in functions performed within the physical **facility**. In such an elaborate environment, the full range of marketing and organizational objectives theoretically can be approached through careful management of the servicescape. For example, a patient's hospital room can be designed to enhance patient comfort and satisfaction while simultaneously facilitating employee productivity. Figure 1 suggests that firms such as hospitals that are positioned in the elaborate interpersonal service cell face the most complex servicescape decisions.

#### CONCEPTUAL FRAMEWORK

Though the typology in Figure 1 highlights the relative complexity of environmental decisions across different types of service organizations, it does not explain what behaviors are influenced, or why, or how one would go about planning and designing an environment to achieve particular objectives. Figure 2 is a rich framework for addressing those questions and for exploring the role of physical environment in service organizations. (Figure 2 omitted) The framework suggests that a variety of objective environmental factors are perceived by both customers and employees and that both groups may respond cognitively, emotionally, and physiologically to the environment. Those internal responses to the environment influence the behavior of individual customers and employees in the servicescape and affect social interactions between and among customers and employees. Though the model shares similarities with other models (e.g., Mehrabian and Russell 1974), it is unique in its breadth of synthesis (for example, Mehrabian and Russell focus on emotional responses only), the incorporation of both customers and employees and their interactions, and its application to commercial settings. In the following sections, each of the components of the framework is defined and developed. Attention centers first on the behaviors that may be influenced by the servicescape and then on the internal responses and the controllable dimensions that constitute the servicescape. propositions based on the framework are highlighted, and implications for firms within specific cells of the service typology are discussed.

## BEHAVIORS IN THE SERVICESCAPE

That human behavior is influenced by the physical setting in which it occurs is essentially a truism. Interestingly, however, until the 1960s psychologists largely ignored the effects of physical setting in their attempts to predict and explain behavior. Since that time, a large and steadily growing body of literature within the field of environmental psychology has addressed the relationships between human beings and their built environments (for reviews of environmental psychology, see Darley and Gilbert 1985; Holahan 1986; Russell and Ward 1982; Stokols and Altman 1987). (1) Here it is assumed that dimensions of the organization's physical surroundings influence important customer and employee behaviors. The types of behaviors that are influenced are identified and discussed next.

### INDIVIDUAL BEHAVIORS

Environmental psychologists suggest that individuals react to places with two general, and opposite, forms of behavior: approach and avoidance (Mehrabian and Russell 1974). Approach behaviors include all positive behaviors that might be directed at a particular place, such as desire to stay, explore, work, and affiliate (Mehrabian and Russell 1974). Avoidance behaviors reflect the opposite, in other words, a desire not to stay, explore, work, and affiliate. In a study of consumers in retail environments, Donovan and Rossiter (1982) found that approach behaviors in that setting (including shopping enjoyment, returning, attraction and friendliness toward others, spending money, time spent browsing, and exploration of the store) were influenced by perceptions of the environment. Milliman (1982, 1986) found that the tempo of background music can affect traffic flow and gross receipts in both supermarket and restaurant settings. In actual service settings, examples of environmental cues being used to change behavior are abundant. At one 7-11 store, the owners played "elevator music" to drive away a youthful market segment that was detracting from the store's image. Cinnamon roll bakeries commonly pump the wonderful fragrance of their freshly baked products out into mall traffic areas to entice customers into the store.

In addition to attracting or deterring entry, the servicescape can actually influence the degree of success consumers experience in executing their plans once inside (Darley and Gilbert 1985; Russell and Snodgrass 1987). Each individual comes to a particular service organization with a goal or purpose that may be aided or hindered by the setting. For example, assume that a traveler enters an airport and (1) is confused because he or she cannot find signage giving directions to the assigned gate and (2) is emotionally distressed because of crowds, poor acoustics, and high temperature. The traveler is unable to carry out the purpose for entering the environment, at least not very easily. Here the servicescape directly inhibits the accomplishment of the customer's goal. Similarly, physical surroundings and conditions could constrain an employee's ability to do his or her work and thereby detract from the purpose for being in the servicescape.

Clearly, firms want to encourage approach behaviors and the ability of customers and employees to carry out their plans while at the same time discouraging avoidance behaviors. As Figure 2 shows, the approach/avoidance behaviors of employees and customers are determined largely by individual internal responses (cognitive, emotional, and physiological) to the environment. The three types of internal responses are discussed in greater detail subsequently. The basic assumption is that positive (negative) internal responses lead to approach (avoidance) behaviors.

P1: Positive (negative) internal responses to the servicescape lead to approach (avoidance) behaviors.

a. For employees, approach includes such behaviors as affiliation, exploration, staying longer, expressions of commitment, and carrying out the purpose for being in the organization. Avoidance is represented by the opposite behaviors.

b. For customers, approach includes such behaviors as coming in, staying, spending money, loyalty, and carrying out the purpose for being in the organization. Avoidance is represented by the opposite behaviors.

#### SOCIAL INTERACTIONS

In addition to its effects on their individual behaviors, the servicescape influences the nature and quality of customer and employee interactions, most directly in interpersonal services. Bennett and Bennett (1970) state that "all social interaction is affected by the physical container in which it occurs." They go on to suggest that the physical container affects the nature of social interaction in terms of the duration of interaction and the actual progression of events. In many service situations, a firm may want to ensure a particular progression of events (i.e., a "standard script") and limit the duration of the service. Forgas (1979) suggests that environmental variables such as propinquity, seating arrangements, size, and flexibility can define the possibilities and limits of social episodes, such as those between and among customers and employees. He also suggests that physical environments represent a subset of social rules, conventions, and expectations in force in a given behavior setting, serving to define the nature of social interaction. In developing the concept of behavior settings, Barker (1968) implies that recurring social behavior patterns are associated with particular physical settings and that when people encounter typical settings, their social behaviors can be predicted.

Empirical studies confirm the impact of physical setting on the nature of social interaction. Behaviors such as small group interaction, friendship formation, participation, aggression, withdrawal, and helping have all been shown to be influenced by environmental conditions (Holahan 1982). Similarly, in studies of workplace design, researchers have found that communication patterns, group cohesion, and the formation of friendships and small groups can be influenced by the physical setting (Sundstrom and Sundstrom 1986, Part III). By implication, those findings suggest that the servicescape influences the nature of social interactions between and among customers and employees.

Examples are again abundant in actual service settings. Even casual observation of a Club Med **facility** confirms that the highly complex setting is designed to encourage social interaction among and between guests and employees. Seating arrangements and the food preparation process at Benihana restaurants similarly encourage interactions among total strangers, as well as contact between patrons and the Japanese chef who prepares their meals in full view. In most airports, in contrast, research suggests that the arrangement of seating typically discourages comfortable conversation among travelers and their companions (Sommer 1974).

One of the challenges in designing environments to enhance individual approach behaviors and encourage the appropriate social interactions is that optimal design for one person or group may not be the optimal design for others. Research in a bank setting suggests, for example, that employees and customers have different needs and desires for their physical surroundings (Baker, Berry, and Parasuraman 1988). Similarly, an environment that is conducive to an employee's individual work needs may not enhance the employee's ability to converse and interact interpersonally with customers.

P2: For interpersonal services, positive (negative) internal responses to the servicescape enhance (detract from) the nature and quality of social interactions between and among customers and employees.

P3: Optimal design for encouraging employee (customer) approach behavior may be incompatible with the design required to meet customer (employee) needs and/or facilitate positive employee-customer interactions.

#### SERVICE TOPOLOGY AND BEHAVIOR

The research tradition in environmental psychology strongly suggests that the physical environment can influence behaviors in several ways. Therefore the first step in the purposeful design of the servicescape is to identify desirable customer and/or employee behaviors and the strategic goals that the organization hopes to advance through its physical **facility**. For example, in designing their corporate headquarters offices, Scandinavian Airline Systems first identified particular goals that it wanted to achieve, among them teamwork and open and frequent communication among managers. The employee behaviors associated with those goals were identified and architects were commissioned to propose designs that would be conducive to the behaviors and ultimately support the strategic goals.

The typology (Figure 1) provides a structure for isolating the relevant behavioral issues. Self-service firms will be most interested in predicting and understanding customer behaviors (e.g., coming in, exploration, staying) in the physical setting and the potential achievement of marketing objectives such as customer attraction, satisfaction, and retention. In contrast, firms that operate remote services will focus on employee behaviors (e.g., productivity, affiliation with coworkers) and the achievement of organizational goals such as teamwork, productivity, and innovation. Organizations that are positioned in the interpersonal service cell will be concerned with both customer and employee behaviors, as well as the effects of physical setting on the interactions between and among customers and employees. There the strategist must understand the plans and goals of all participants and anticipate compatibility dilemmas in designing the servicescape. Once behaviors most likely to be influenced by the servicescape are identified, challenging questions emerge: What internal responses (e.g., feelings, beliefs) will lead to the desired behaviors and how should the environment be configured to bring about such responses? The next two sections address those questions.

#### INTERNAL RESPONSES TO THE SERVICESCAPE

One can infer from the environmental psychology literature that employees and customers in service firms respond to dimensions of their physical surrounding cognitively, emotionally, and physiologically, and that those responses are what influence their behaviors in the environment. Hence, the perceived servicescape does not directly cause people to behave in certain ways. As Figure 2 shows, perceptions of the servicescape lead to certain emotions, beliefs, and physiological sensations which in turn influence behaviors. Behaviors are thus mediated by a person's internal responses to the place. Though the internal responses (cognitive, emotional, and physiological) are discussed independently here, they are clearly interdependent. For example, a person's beliefs about a place, a cognitive response, may well influence emotional response to the place and vice versa.

#### ENVIRONMENT AND COGNITION

As shown in Figure 2, the perceived servicescape may elicit cognitive responses (Golledge 1987; Kaplan and Kaplan 1982; Rapoport 1982), influencing people's beliefs about a place and their beliefs about the people and products found in that place. In that sense, the environment can be viewed as a form of nonverbal communication (Broadbent, Bunt, and Jencks 1980; Rapoport 1982), imparting meaning through what Ruesch and Kees (1956) called "object language." For example, particular environmental cues such as the type of office furniture and decor and the apparel worn by a lawyer may influence a potential client's beliefs about whether the lawyer is



successful or not successful, expensive or not expensive, and trustworthy or not trustworthy. In a consumer study, variations in verbal descriptions of store atmospherics were found to alter beliefs about a product (perfume) sold in the store (Gardner and Siomkos 1986). Another study showed that a travel agent's office decor affected customer attributions for the travel agent's behavior (Bitner 1990). Variations in environmental cues may also affect employees' beliefs. For example, office size and type of furnishings may affect an employee's beliefs about the importance of his or her function within the firm in relation to other employees. In all of those cases, perceptions of the servicescape influence beliefs about the environment itself, but also appear to affect beliefs about other, seemingly unrelated, service attributes.

In other cases, perceptions of the servicescape may simply help people to distinguish a firm by influencing how it is categorized. Categorization is the process by which people assign a label to an object; when people see a feathered animal flying through the air, they categorize it as a "bird" and not a "fish" (Loken and Ward 1990; Mervis and Rosch 1981). Similarly, the overall perception of the servicescape enables the **consumer** or employee to categorize the firm mentally. For example, **research** shows that in the restaurant industry a particular configuration of environmental cues suggests "fast food" whereas another configuration suggests "elegant sit-down restaurant" (Ward, Bitner, and Barnes 1992). In such situations, environmental cues serve as a mnemonic or shortcut device enabling customers to categorize and distinguish among types of restaurants.

Because services are relatively intangible in comparison with most manufactured goods (Shostack 1977) and because many services are high in experience and credence attributes (Zeithaml 1981), they generally afford fewer intrinsic cues on which to form beliefs about service quality, particularly in initial purchase situations. Hence, in such situations consumers and employees tend to use extrinsic cues (such as the physical surroundings) to infer quality (Zeithaml 1988). In other words, people may use their beliefs about the servicescape as surrogate indicators in forming beliefs about service quality and other attributes of the service and/or the people who work in the organization.

P4: Perceptions of the servicescape and associated positive (negative) cognitions can lead to positive (negative) beliefs and attributions associated with the organization, its people, and its products.

P5: Perceptions of the servicescape influence how people categorize the organization; thus, the environment serves as a mnemonic in differentiating among firms.

P6: The servicescape's influence on beliefs, attributions, and categorization of the organization is stronger for inexperienced customers or new employees, and when few intrinsic cues are available on which to categorize or base beliefs.

#### ENVIRONMENT AND EMOTION

In addition to influencing cognitions, the perceived servicescape may elicit emotional responses that in turn influence behaviors. In a long stream of research, Mehrabian and Russell and their colleagues have programmatically explored emotional responses to environments (e.g., Mehrabian and Russell 1974; Russell and Lanius 1984; Russell and Pratt 1980; Russell and Snodgrass 1987). Through their research they have concluded that the emotion-eliciting qualities of environments are captured by two dimensions: pleasure-displeasure and degree of arousal (i.e., amount of stimulation or excitement). In other words, any environment, whether natural or manmade, can be located in a two-dimensional space reflecting peoples' emotional response to the place. Research shows that emotional response measured on those dimensions can predict behaviors with respect to the environment. For example, environments that elicit feelings of pleasure

are likely to be ones where people want to spend time and money (Donovan and Rossiter 1982; Mehrabian and Russell 1974), whereas unpleasant environments are avoided. Similarly, arousing environments are viewed positively unless the excitement is combined with unpleasantness (Mehrabian and Russell 1974). That is, unpleasant environments that are also high in arousal (lots of stimulation, noise, confusion) are particularly avoided. Hui and Bateson (1991) found that in the context of environmental crowding, increased perceptions of personal control are related positively to increased pleasure. Other environmental dimensions (e.g., clear signage, good ventilation, adequate space) may also increase perceptions or personal control.

Research also suggests that emotional responses to the environment may be transferred to people and/or objects within the environment (Maslow and Mintz 1956; Mintz 1956; Obermiller and Bitner 1984). In the Obermiller and Bitner study, respondents who viewed retail products in an emotionally pleasing environment evaluated the products more positively than did subjects who viewed the same products in an unpleasing environment. Hence, perceptions of the servicescape appear to have influenced seemingly unrelated feelings about the products.

Other researchers also have emphasized the emotion-eliciting or affective qualities of environments, suggesting that environments can be viewed as aesthetic stimuli capable of eliciting affect (Wohlwill 1976). In his work aimed at explaining the affective assessment of outdoor environments, Kaplan (1987) concluded that preference for or liking of a particular environment can be predicted by three environmental dimensions: complexity, mystery, and coherence. Complexity (visual richness, ornamentation, information rate) has been found consistently to increase emotional arousal, whereas coherence (order, clarity, unity) has been found to enhance positive evaluation (Nasar 1989). In addition, compatibility has been found to influence perceptions of order, and preference has been found to increase with compatibility (Nasar 1987). Compatibility in natural settings refers to how well a place blends in with its surroundings and is related inversely to contrasts (in color, texture, size, and shape) with the natural background; in urban settings compatibility results from replication of features such as materials, style, and overall shapes (Nasar 1989). Other research has shown that people respond positively to nature and prefer natural to manmade elements (Kaplan and Kaplan 1982), whereas the presence of what Nasar (1989) terms environmental "nuisances" has been found to reduce preference and perceptions of quality in urban settings. In urban settings such things as poles, wires, signs, and dilapidated buildings and vehicles are classified as nuisances. Research is needed to define the cues that would determine compatibility and the objects that would be classified as nuisances in service settings.

P7: Customer and employee emotional responses to the servicescape can be captured by two dimensions, pleasure and arousal.

a. Pleasure increases approach behaviors.

b. Arousal, except when combined with unpleasantness, increases approach behaviors.

P8: Perceptions of greater personal control in the servicescape increase pleasure.

P9: Complexity in the servicescape increases emotional arousal.

P10: Compatibility, the presence of natural elements, and the absence of environmental "nuisances" in the servicescape enhance pleasure.

P11: Perceptions of the servicescape and associated positive (negative) emotions can lead to positive (negative) feelings associated with the

organization, its people, and its products.

#### ENVIRONMENT AND PHYSIOLOGY

The perceived servicescape may also affect people in purely physiological ways. Noise that is too loud may cause physical discomfort, the temperature of a room may cause people to shiver or perspire, the air quality may make it difficult to breathe, and the glare of lighting may decrease ability to see and cause physical pain. All of those physical responses may in turn directly influence whether or not people stay in and enjoy a particular environment. For example, it is well known that the relative comfort of seating in a restaurant influences how long people stay. When they become uncomfortable (subconsciously or consciously) sitting on a hard surface in a fast food restaurant, most people leave within a predictable period of time. Similarly, environmental design and related physiological responses affect whether a person can perform his or her job function (e.g., Riley and Cochran 1984).

A vast amount of research in engineering and design has addressed human physiological responses to ambient conditions as well as physiological responses to equipment design (Bennett 1977; Osborne 1987; Sanders and McCormick 1987). Such research fits under the rubric of human factors design or ergonomics. Human factors research systematically applies relevant information about human capabilities and limitations to the design of things and procedures people use. The primary focus and application of the research has been within the military, in space programs, and in the design of computers, automobiles, and employee work stations. Such research has great potential for application in the design of commercial environments, taking into account the effects of design on both customers and employees who coexist and interact in the environment.

In addition to directly affecting behavior, physiological responses may influence seemingly unrelated beliefs and feelings about the place and the people there. Research has shown that when people are physically uncomfortable because of ambient temperature, their affective response to strangers is less positive than when they are physically comfortable (Griffitt 1970). Mehrabian and Russell (1974, ch. 4) review numerous studies of emotional reactions to sensory stimuli such as color, thermal conditions, light intensity, sound, and odors.

P12: Positive (negative) physiological responses to the servicescape can result in positive (negative) beliefs and feelings associated with the organization, its people, 105and its products.

#### SERVICE TYPOLOGY AND INTERNAL RESPONSES

Combining the typology of servicescapes (Figure 1) with the conceptual understanding of the internal responses of customers and employees leads to insights for designing and managing the servicescape. For example, a self-service firm that wants to enhance customer approach behaviors such as attraction and staying longer can assess the environmental dimensions or cues that may elicit particular cognitive, emotional, or physiological responses. Attraction would most likely be facilitated by positive cognitive and emotional responses to the firm's exterior, whereas staying would depend more on positive emotional and physiological responses to the organization's interior space. In measuring the emotion-eliciting qualities of a particular servicescape, attention might be given to emotional dimensions identified by Mehrabian and Russell (pleasure-displeasure and degree of arousal) as well as to perceptions of control (Hui and Bateson 1991).

For interpersonal services, an effective servicescape design anticipates the likely responses of employees and customers to environmental conditions and creates the proper setting for the service encounter. In such cases, several goals and behaviors will be identified for both customers and employees as well as for their interactions. The desired behaviors then can

be linked directly to their internal response counterparts. For example, what type of emotional response on the part of customers will be needed to encourage them to interact comfortably with each other as in the case of a Club Med? Or, in the case of a hospital, what beliefs, emotions, and physiological responses will encourage patients to get up and walk around the **facility** if that is a desired behavior for their recovery?

Because elaborate services (e.g., banks, hospitals, restaurants) consist of many forms and spaces, planning for compatibility and coherence is a particularly challenging task. In lean environments, coherence would be easier to achieve and measure and nuisances easier to identify and eliminate. Similarly, enhancing personal control is more straightforward in remote and self-service firms than in interpersonal service firms, where giving a sense of control to both employees and customers simultaneously may be difficult.

#### RESPONSE MODERATORS

In general, people respond to environments in the ways described here--cognitively, emotionally, physiologically--and their responses influence how they behave in the environment. As with all behavioral relationships, however, the strength and direction of the relation between variables is moderated by personal and situational factors. Here, and in Figure 2, those factors are referred to as "response moderators." Studies have shown that individual personality traits can influence a person's reaction to his or her physical surroundings (Mehrabian and Russell 1974; Russell and Snodgrass 1987). Arousal-seeking is one such trait. Arousal-seekers enjoy and look for high levels of stimulation, whereas arousal-avoiders prefer lower levels of stimulation. Thus, an arousal-avoider who found him- or herself in a loud, bright disco with flashing neon might show strong dislike for the environment whereas an arousal-seeker would be very happy. In a related vein, Mehrabian (1977) proposed that some people are better screeners of environmental stimuli than others. Screeners of stimuli would be able to experience high levels of stimulation, but not be affected by it. In other words, they can ignore external environmental stimulation. Nonscreeners would be highly affected and might exhibit extreme responses even to low levels of stimulation.

An individual's response to an environment often depends on situational factors as well, such as his or her plan or purpose for being in the environment (Russell and Snodgrass 1987; Snodgrass, Russell, and Ward 1988). Though the individual differences in personality traits are relatively stable, plans and purposes for being in or seeking out a particular environment may vary from day to day or hour to hour. What the individual notices and remembers about the environment, as well as how he or she feels about it, is influenced by the purpose for being there. In a laboratory study, subjects' knowledge of environmental details and affective response to a place were found to be influenced by what they had planned to do while there--wait, explore, spy, or redecorate (Ward et al. 1988).

In addition to the plan or purpose, each individual enters an environment in a particular mood state (e.g., happy, depressed, lonely, anxious, excited, impatient). Such mood states are likely to affect as well as be differentially affected by variations in physical surroundings (see Gardner 1985). A person who is feeling anxious and fatigued after a frustrating day at work is likely to be affected differently by a highly arousing restaurant environment than he or she would be after a relaxing three-day weekend. Similarly, Harrell and Hutt (1976) suggest that people who are impatient or very time sensitive on entering a retail store are more affected by crowding than those who are patient and not sensitive to time factors.

What an individual expects to find in an environment also affects how the individual responds to the place. In general, when expectations are negatively disconfirmed, the person is likely to dislike the place. The

opposite occurs when expectations are met or when the environment exceeds expectations. Expectations vary across individuals on the basis of their past experiences in the environment or in similar environments, as well as what they have heard or read about the place.

P13: Personality traits (such as arousal-seeking tendencies and ability to screen environmental stimuli) moderate the relationship between the perceived servicescape and internal responses.

P14: Situational factors (such as expectations, momentary mood, plans and purposes for being in the servicescape) moderate the relationship between the perceived servicescape and internal responses.

#### DIMENSIONS OF THE SERVICESCAPE

A complex mix of environmental features constitute the servicescape and influence internal responses and behaviors. Specifically, the dimensions of the physical surroundings include all of the objective physical factors that can be controlled by the firm to enhance (or constrain) employee and customer actions. Those factors include an endless list of possibilities, such as lighting, color, signage, textures, quality of materials, style of furnishings, layout, wall decor, temperature, and so on. On the basis of a review of diverse literatures, three composite dimensions were identified as being particularly relevant to the present analysis: ambient conditions, spatial layout and functionality, and signs, symbols, and artifacts (see Figure 2). Because the base of research findings is context-specific and therefore not easily generalized, the effect of a single dimension on customers and employees is difficult to forecast. However, relevant dimensions of the servicescape can be isolated and general patterns can be explored.

Environmental psychologists contend that people respond to their environments holistically. That is, though individuals perceive discrete stimuli, it is the total configuration of stimuli that determines their responses to the environment (Bell, Fisher, and Loomis 1978; Holahan 1982; Ittelson et al. 1974). Hence, though the dimensions of the environment are defined independently here, it is important to recognize that they are perceived by employees and customers as a holistic pattern of interdependent stimuli. Note in Figure 2 that the holistic pattern is reflected in the perceived servicescape construct.

P15: Customers and employees perceive the environment holistically, as a composite of three dimensions: ambient conditions; spatial layout and functionality; signs, symbols, and artifacts. Each dimension may affect the overall perception independently and/or through its interactions with the other dimensions.

#### AMBIENT CONDITIONS

Several authors have identified ambient conditions as a factor that affects perceptions of and human responses to the environment (Baker 1987; Baker, Berry, and Parasuraman 1988; Becker 1981; Darley and Gilbert 1985; Russell and Snodgrass 1987; Sundstrom and Sundstrom 1986; Wineman 1982). Ambient conditions include background characteristics of the environment such as temperature, lighting, noise, music, and scent. As a general rule, ambient conditions affect the five senses. However, sometimes such dimensions may be totally imperceptible (gases, chemicals, infrasound), yet may have profound effects (Russell and Snodgrass 1987), particularly on employees who spend long hours in the environment.

A very limited number of empirical studies in **consumer research** confirm that ambient factors may influence customer responses. For example, in studies of restaurants and supermarkets, it has been illustrated that music tempo can affect pace of shopping, length of stay, and amount of money spent (Milliman 1982, 1986). In another study, familiarity of music played

in a department store setting was found to affect shopper's perceptions of how long they spent shopping; when the music was unfamiliar to subjects, they believed they had spent more time shopping (Yalch and Spangenberg 1988). Hundreds of studies of the workplace spanning many decades have shown that lighting, temperature, noise, music, and color can all influence employee performance and job satisfaction (see Sundstrom and Sundstrom 1986, Part II, for a review).

P16: The effects of ambient conditions on the overall, holistic perception of the servicescape are especially noticeable when they are extreme (e.g., loud music, high temperature), when the customer or employee spends considerable time in the servicescape (e.g., hospital stay vs. visit to dry cleaner). and when they conflict with expectations (e.g.. loud music in a law office).

#### SPATIAL LAYOUT AND FUNCTIONALITY

Because service encounter environments are purposeful environments (i.e., they exist to fulfill specific needs of consumers, often through the successful completion of employee actions), spatial layout and functionality of the physical surroundings are particularly important. Spatial layout refers to the ways in which machinery, equipment, and furnishings are arranged, the size and shape of those items, and the spatial relationships among them. Functionality refers to the ability of the same items to facilitate performance and the accomplishment of goals. Much of the empirical research in organizational behavior and psychology has illustrated effects of the spatial layout and functionality dimension, always from the employee's point of view (for reviews, see Davis 1984; Sundstrom and Sundstrom 1986; Wineman 1982, 1986). With the exception of some research on retail store layout, crowding (Harrell and Hutt 1976; Harrell, Hutt, and Anderson 1980; Hui and Bateson 1990, 1991), and use of orientation aids (e.g., Levine, Marchon, and Hanley 1984; Seidel 1983; Wener 1985), surprisingly little has been published about the effects of spatial layout and functionality on customers in commercial service settings. Logic suggests that spatial layout and functionality of the environment are highly salient to customers in self-service environments where they must perform on their own and cannot rely on employees to assist them. Similarly, if the tasks to be performed are very complex, efficiency of layout and functionality will be more important than when the tasks are mundane or simple. When either the employees or customers are under time pressure, they will also be highly conscious of the relative ease with which they can perform their tasks in the environment.

P17: The effects of spatial layout and functionality are particularly salient in self-service settings, when the tasks to be performed are complex, and when either the employee or customer is under time pressure.

#### SIGNS, SYMBOLS, AND ARTIFACTS

Many items in the physical environment serve as explicit or implicit signals that communicate about the place to its users (Becker 1977, 1981; Davis 1984; Wener 1985; Wineman 1982). Signs displayed on the exterior and interior of a structure are examples of explicit communicators. They can be used as labels (e.g., name of company, name of department), for directional purposes (e.g., entrances, exits), and to communicate rules of behavior (e.g., no smoking, children must be accompanied by an adult). Signage can play an important part in communicating firm image. Signs have even been found to reduce perceived crowding and stress in a jail lobby setting (Wener and Kaminoff 1982).

Other environmental objects may communicate less directly than signs, giving implicit cues to users about the meaning of the place and norms and expectations for behavior in the place. Quality of materials used in construction, artwork, presence of certificates and photographs on walls, floor coverings, and personal objects displayed in the environment can all

communicate symbolic meaning and create an overall aesthetic impression. Restaurant managers, for example, know that white table cloths and subdued lighting symbolically convey full service and relatively high prices, whereas counter service, plastic furnishings, and bright lighting symbolize the opposite. In office environments, certain cues such as desk size and placement symbolize status and may be used to reinforce professional image (Davis 1984; McCaskey 1979; Peters 1978; Pfeffer 1981; Sundstrom and Sundstrom 1986). Studies of faculty office design indicate that desk placement, presence of diplomas on the wall, and tidiness of the office can influence students' beliefs about the person occupying the office (Campbell 1979; Morrow and McElroy 1981). In another study of faculty offices, certain environmental cues were found to be symbolically associated with personality traits of the faculty member believed to occupy the office (Ward, Bitner, and Gossett 1989). Such symbolic and aesthetic communication is extremely complex--it may be intentionally conveyed or it may be accidental, it may be subject to multiple interpretations, and it may have intended and unintended consequences (Becker 1977; Davis 1984).

P18: Signs, symbols, and artifacts are particularly important in forming first impressions, for communicating new service concepts, for repositioning a service, and in highly competitive industries where customers are looking for cues to differentiate the organization.

#### SERVICE TYPOLOGY AND ENVIRONMENTAL DIMENSIONS

In a classic study, Whyte (1980) observed human activity in public spaces and found that even subtle changes in design (e.g., adding plants and flowers, providing comfortable perches) led to a rather dramatic increase in activity and utilization. Similar results might be achieved by examining the direction and flow of activities in a particular servicescape. For example, changes in the layout and furnishings of the service facility can be made to speed the flow of transactions, encourage particular forms of interaction between and among customers and employees, or provide opportunities for customers to linger.

The importance of particular environmental dimensions is likely to vary across the typology of service organizations (Figure 1). For example, for self-service situations such as Ticketron facilities, ATMs, or Golf Land, the spatial layout and functionality dimension of the servicescape is extremely important. Clear directions and simple layout aid the customer in completing the transaction. At the other extreme, for remote services, ambient conditions assume more importance because employees tend to spend extended periods of time in the servicescape. Their physical comfort (temperature level, lighting) and responses to noise level and/or music affect productivity and overall satisfaction. Ambient conditions are similarly important to employee productivity in many interpersonal service businesses such as banks, hospitals, and hotels, but in those cases employee preferences must be balanced against customer needs. These are just a few of many possible examples.

Rather than a single element, it is ultimately the total configuration of environmental dimensions that defines the servicescape.

#### MANAGERIAL IMPLICATIONS

By isolating the impact of the servicescape on both customers and employees, the theoretical framework raises several challenging managerial implications. The overall conclusion is that through careful and creative management of the servicescape, firms may be able to contribute to the achievement of both external marketing goals and internal organizational goals. Many specific implications are discussed in preceding sections; some general strategic observations are offered here.

The typology of service organizations combined with the theoretical framework suggests that the physical environment may assume a variety of

strategic roles in services marketing and management. First, the servicescape provides a visual metaphor for an organization's total offering. In other words, the dimensions of the servicescape act as a package, similar to a product's package, by conveying a total image and suggesting the potential usage and relative quality of the service (Solomon 1985). Yet, the care given to product package design is commonly lacking in service "package" design. Second, the servicescape can assume a facilitator role by either aiding or hindering the ability of customers and employees to carry out their respective activities. The floorplan, layout of equipment, and equipment design can have a major impact on the ability of users to complete their tasks and achieve their service goals. As a facilitator, the servicescape can also encourage and nurture particular forms of social interaction among and between employees and customers. Finally, the physical environment can serve as a differentiator in signaling the intended market segment, positioning the organization, and conveying distinctiveness from competitors. Each of the roles can be shaped to a significant degree to support important services marketing and management objectives of the organization.

The typology of service organizations (Figure 1) and the theoretical framework (Figure 2) help to direct managers to relevant issues and questions that should be asked in forming servicescape strategy around the basic roles. In addition, service organizations can gain strategic insights by examining how the servicescape is designed and managed in other industries that occupy the same cell in the typology and thus share similar characteristics.

To secure strategy advantages from the servicescape, the needs of ultimate users and the requirements of various functional units must be incorporated into environmental design decisions. The services marketing manager must be a strong advocate for using the servicescape as an element of the organization's strategy. Yet, in most organizations, environmental management is a separate function performed by persons with titles such as "environmental space manager," " **facility** planner," and " **facility** manager" (Becker 1981; Davis and Szigeti 1982). In many organizations, environmental decisions are made routinely without much attention to the impact on employee (or consumer) behavior (Becker 1981, p. 5).

A clear implication of the conceptual framework (Figure 2) is the need for cross-functional cooperation in decision making about service environments. " **Facility** planning and management . . . is a problemsolving activity that lies on the boundaries between architecture, interior-space planning and product design, organizational and consumer! behavior, planning and environmental psychology" (Becker 1981, p. 7). As such, decisions about the physical **facility** can have an impact on human resource goals (e.g., worker retention, worker productivity), operations goals (e.g., efficiency, cost reduction), and marketing goals (e.g., consumer attraction, consumer satisfaction). Ideally, therefore, major changes in physical design or the planning of new environments should benefit from input from managers in all three areas, grounded in direct input from actual users--that is, employees and customers.

#### RESEARCH IMPLICATIONS

The conceptual framework and the servicescape typology suggest a wide range of **research** possibilities. Given the scarcity of **research** reported in the **consumer** behavior and marketing literature, there is a tremendous opportunity for theory building, empirical testing, development of better measures and methods, and application/replication of findings from other fields. Figure 2 and the preceding specific propositions provide numerous starting points for research. The propositions are purposefully general. Each one could be explored and expanded through empirical **research**. For example, given a specific commercial environment, how does a **consumer**'s (or employee's) purpose for being there affect the person's response to the



place? That question addresses the moderating effects of situational factors in determining environmental responses. Alternatively, one could start with a particular social interaction behavior such as teamwork among employees and work back through the framework to discover the types of internal responses and relevant environmental dimensions that would encourage such behavior. In addition to the basic research suggested by the framework and propositions, there is a need for research that will illuminate the differential importance and differential effects of physical surroundings across types of service industries such as those identified in Figure 1. Research opportunities also are available in exploring the ability of the physical environment to achieve particular objectives of the firm, and at what cost.

In many cases, extensive work in environmental psychology and organizational behavior (e.g., the stream of research by Russell and his colleagues and the review of workplace research by Sundstrom and Sundstrom 1986) can be applied and extended into the consumer service setting. In other cases, as in the effects of the environment on social interactions among customers and employees, the fact that there is relatively little empirical work in any field to draw on allows for true pioneering research to be done.

Given the complexity of environment/behavior relationships, a variety of methods will be appropriate (see Bechtel, Marans, and Michelson 1987). Direct observation of environmental conditions and customer and employee behaviors may be most appropriate in some cases--for example, in research on the effect of **facility** layout options on customer/employee interaction patterns. The application of direct observation methods has just recently gained acceptance in the marketing literature (e.g., Belk, Sherry, and Wallendorf 1988; Belk, Wallendorf, and Sherry 1989), but has not yet been applied to the observation of consumption environments (for an exception, see Sherry and McGrath 1989). Using observation methods, trained observers could make detailed accounts of current environmental conditions (i.e., environmental dimensions in Figure 2) and the actual behaviors of the occupants. Such observations could be extremely detailed and useful in an applied sense in redesigning a **facility** or in comparing environments. For theory development, direct observation could be the source of additional propositions.

Experimental methods and surveys also would be appropriate for assessing the impact of design dimensions on consumers and employees. Because of the expense involved in constructing actual **environments**, some form of **simulated environment** (verbal descriptions, photos/slides, scale models, videos) could be used in experimental studies (see Bechtel, Marans, and Michelson 1987, ch. 5). The **environmental** psychology tradition has shown that **simulated environments** work well in achieving generalizable results (Nasar 1989). In designing experiments, the researcher should recall that people perceive environments holistically. It may be necessary to vary several environmental dimensions (e.g., artifacts, layout, color, tidiness) simultaneously to achieve an overall perception of the surroundings that will significantly influence behavior. User surveys are likely to be most appropriate in assessing basic customer/employee needs and preferences prior to the design of experimental simulations, and later for postdesign evaluation.

For both experiments and surveys, applicable response measures are needed. If one uses Figure 2 as a guide, appropriate measures of cognitive, emotional, and physiological response to environments are needed, as well as measures of relevant individual differences. Though several standardized measures already are available (e.g., Lemke et al. 1979; McKechnie 1974; Mehrabian 1977; Russell and Snodgrass 1987), most have not been applied to consumers in commercial settings, thus opening an opportunity for replication and assessment of generalizability. Other, more novel approaches to measuring customer and employee responses to environments

also could be considered. For example, Ward, Bitner, and Gossett (1989) suggest an approach to measuring the symbolic meaning of service environments that adapts and extends ideas from research on object meaning (Kleine and Kernan 1988; Szalay and Deese 1978).

The typology, framework, and propositions provide direction for research on a topic that is incredibly rich, and invite application of the full range of consumer and organizational methods and theories to gain a better understanding of its impact.

1 Research on the built environment is only one aspect of environmental psychology. The field also encompasses the study of human beings and their relationships with the natural and social environment. What distinguishes environmental psychology from other areas of inquiry is its concern "with the reciprocal and interactive influences that take place between the thinking and behavior of an organism and the environment surrounding that organism" (Darley and Gilbert 1985, p. 949).

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Mary Jo Bitner is Assistant Professor of Marketing, Arizona State University. The author acknowledges the support of the First Interstate Center for Services Marketing, Arizona State University, in conducting the research. The extensive assistance of Michael Hutt and the comments of Lawrence Crosby, Stephen Brown, Beth Walker, and Susan Kleine are gratefully acknowledged, as are the helpful suggestions of three anonymous JM reviewers.

THIS IS THE FULL-TEXT.

DESCRIPTORS: Service industries; Facilities planning; Impacts; Behavior; Office landscaping

CLASSIFICATION CODES: 8300 (CN=Service industries not elsewhere classified); 5110 (CN=Office management); 2500 (CN=Organizational behavior)

...TEXT: frequently the impact of a specific design or design change on ultimate users of the **facility** is not fully understood.

The ability of the physical environment to influence behaviors and to...

... consumer is "in the factory," often experiencing the total service within the firm's physical **facility**. The factory (or the place where the service is produced) cannot be hidden and may...

... direct human contact, customers and employees interact with each other within the organization's physical **facility**. Ideally, therefore, the organization's environment should support the needs and preferences of both service...

... important in service settings because customers as well as employees often experience the firm's **facility**. However, not all service firms and industries are alike (Lovelock 1983; Schmenner 1986), nor do...its many floors, rooms, sophisticated equipment, and complex variability in functions performed within the physical **facility**. In such an elaborate environment, the full range of marketing and organizational objectives theoretically can...Examples are again abundant in actual service settings. Even casual observation of a Club Med **facility** confirms that the highly complex setting is designed to encourage social interaction among and between...

... employee behaviors and the strategic goals that the organization hopes

to advance through its physical **facility**. For example, in designing their corporate headquarters offices, Scandinavian Airline Systems first identified particular goals... (Ward 1990; Mervis and Rosch 1981). Similarly, the overall perception of the servicescape enables the **consumer** or employee to categorize the firm mentally. For example, **research** shows that in the restaurant industry a particular configuration of environmental cues suggests "fast food... beliefs, emotions, and physiological responses will encourage patients to get up and walk around the **facility** if that is a desired behavior for their recovery?

Because elaborate services (e.g., banks... who spend long hours in the environment.

A very limited number of empirical studies in **consumer research** confirm that ambient factors may influence customer responses. For example, in studies of restaurants and...

... in a particular servicescape. For example, changes in the layout and furnishings of the service **facility** can be made to speed the flow of transactions, encourage particular forms of interaction between... management is a separate function performed by persons with titles such as "environmental space manager," " **facility** planner," and " **facility** manager" (Becker 1981; Davis and Sziget 1982). In many organizations, environmental decisions are made routinely...

... Figure 2) is the need for cross-functional cooperation in decision making about service environments. " **Facility** planning and management . . . is a problemsolving activity that lies on the boundaries between architecture, interior...

... behavior, planning and environmental psychology" (Becker 1981, p. 7). As such, decisions about the physical **facility** can have an impact on human resource goals (e.g., worker retention, worker productivity), operations...

... customers.

#### RESEARCH IMPLICATIONS

The conceptual framework and the servicescape typology suggest a wide range of **research** possibilities. Given the scarcity of **research** reported in the **consumer** behavior and marketing literature, there is a tremendous opportunity for theory building, empirical testing, development...

... research. The propositions are purposefully general. Each one could be explored and expanded through empirical **research**. For example, given a specific commercial environment, how does a **consumer's** (or employee's) purpose for being there affect the person's response to the... may be most appropriate in some cases--for example, in research on the effect of **facility** layout options on customer/employee interaction patterns. The application of direct observation methods has just...

... Such observations could be extremely detailed and useful in an applied sense in redesigning a **facility** or in comparing environments. For theory development, direct observation could be the source of additional...

... of design dimensions on consumers and employees. Because of the expense involved in constructing actual **environments**, some form of **simulated environment** (verbal descriptions, photos/slides, scale models, videos) could be used in experimental studies (see Bechtel, Marans, and Michelson 1987, ch. 5). The **environmental** psychology tradition has shown that **simulated environments** work well in achieving generalizable results (Nasar 1989). In designing experiments, the researcher should recall...

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File 12  
B3  
D4

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DESCRIPTORS: Internet; Marketing; Consumer behavior; Studies  
CLASSIFICATION CODES: 5250 (CN=Telecommunications systems); 7000  
(CN=Marketing); 9130 (CN=Experimental/Theoretical)

...TEXT: and sundries. Consumers shopped by means of computer type consoles linked electronically to a central distribution **facility** that employed, among other things, electronic funds transfer to control costs. Automated order filling of...120-131. , Bari A. Harlam, Barbara E. Kahn, and Leonard M. Lodish.1992. "Comparing Dynamic **Consumer** Choice in Real and Computer-Simulated **Environments** ." Journal of **Consumer Research** 19 (June): 71-82. Choi, S. Chan. 1991. "Price Competition in a Channel Structure With ...

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**Making survey-based price experiments more accurate.**

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Abstract

Marketers frequently want to know how the sales of their brand will respond to a change in price. Survey-based price experiments are a convenient and cheap method of finding this out, but they have a reputation for giving inaccurate estimates of price effects. These inaccuracies can include over-estimation of price effects, non-significant price effects, and even positive price elasticities. We sought to identify some of the causes of these inaccuracies by analysing both the existing literature and the results of a recent mall intercept survey based price experiment

(n=382). We found that: (i) when price effects were overestimated, pictures of the relevant brands had not been included; and (ii) when non-buyers of the category were included in the sample, price effects were increasingly non-significant, and elasticities were sometimes even positive. Consequently, managers should be able to use the results of survey-based price research with greater confidence when some form of pictorial representation is used and non-buyers are not forced to make a choice.

#### Introduction

Marketers frequently want to know how the sales of their brand will respond to a change in price. The best way to find this out is with an experiment. Experimental pricing research has many advantages including ensuring adequate price variation, controlling for confounding factors, and the ability to test many different price conditions. Unfortunately, field pricing experiments are relatively difficult and expensive to arrange.

An alternative, cheaper, approach is to use personal interviews using showcards, with respondents indicating a preference rather than making an actual purchase. As Nagle & Holden (1995) point out, such simulated purchase surveys are also, in effect, experiments, as they involve controlled manipulation of prices by the researcher.

However, they do not involve such a realistic shopping experience or a real purchase, and validation studies of these survey-based price experiments have had mixed results. Stout (1969) found that a survey did not produce significant or consistently negative price elasticity estimates, although an in-store experiment did. Gabor et al (1970) found that the results of a survey were similar to the results of an in-store experiment for two types of household cleaner, but the price effects were too high for instant coffee. Nevin (1974) found that price effects estimated from a survey were slightly high for cola, but notably higher for coffee, when compared with an in-store experiment. Although these validation studies were conducted some time ago, they are still cited in pricing textbooks (Monroe 1990, Nagle & Holden 1995), and they form the basis of Nagle & Holden's conclusion that:

'Given the fact that simulated purchase experiments are not consistently reliable, they should be used with caution and accepted only when the results are supported by actual purchase data or other types of tests' (Nagle & Holden 1995, p. 343).

This paper seeks to identify some of the major sources of errors in survey-based price experiments, and to suggest ways in which they can be addressed. By improving the reliability of such methods we hope to give managers and researchers greater confidence in the use of survey-based price experiments. This has important practical implications for pricing research, both in terms of validation of existing techniques, and in justifying the use of these techniques to test a far greater range of price conditions than would otherwise be possible within a fixed research budget.

We proceed by first examining the problem of over-estimates of price effects, and comment on this through an analysis of the existing literature. We then examine the problem of non-significant and positive price effects, and identify a factor contributing to this problem by analysing the results of some of our own recent empirical work.

#### The problem of over-estimated price effects

When the validation studies mentioned earlier are examined closely, it becomes apparent that a lack of true representation of alternatives contributed to the overestimates of price effects. The omission of pictorial representations resulted in the collection of much less accurate data, presumably because the choice situation became much less realistic.

Stout (1969) did not obtain large overstatements of price elasticities. However Stout used colour photographs of the test products, with the price appearing at the bottom of each photograph.

Gabor et al (1970) compared the results of an in-store experiment with the results of a survey based price experiment for brands in three different categories (two types of household cleaner and one instant coffee). They plotted the relative price of these brands against their relative shares, but did not report elasticities.

Gabor et al (1970) stated that they did include line drawings of the

most popular sizes of the brands on their showcards, as well as a list of corresponding prices for other packet sizes. Yet despite valid estimates for the household cleaners, a major overstatement of price effect was obtained for instant coffee. Gabor et al (1970) attributed this greater enforced awareness of price than existed in the marketplace. However, they also noted in passing in their article that 'the line drawing was omitted for instant coffee, to provide more room for the list' (of prices for other sizes). It seems likely that this omission was responsible for the increase in price sensitivity in this category.

Nevin (1974) tested price effects in two categories, non-diet cola and non-instant coffee, and compared the results of an instore experiment with two types of survey-based price experiments. He found that the survey-based techniques both gave reasonably valid estimates of price effects for cola, but relatively invalid estimates for coffee. He also found that, for both categories, the estimates from the survey-based techniques became inflated as the size of the price change increased.

Nevin used index cards to represent the alternative price treatments, but apparently without pictorial representations. For the simulated shopping, he said that each card 'listed the available brands and their corresponding prices'. For the paired preference experiment each card 'listed one of the possible pairs of brands and their prices'.

Furthermore, in subsequent research on another topic, Burke et al (1992) found that when a pictorial representation was omitted from a survey-based pricing experiment, the price effect was significantly over-stated. However, when a pictorial representation was included, the results were not significantly different from actual purchase records for the same respondents.

Taken together, these results provide evidence that survey-based pricing research requires pictorial representations as a basic step towards realism in monitoring price effects. Without them, the effect of a price change tends to be over-estimated.

The problem of non-significant and positive price elasticities

Stout (1969) is the source of reports of non-significant and positive price elasticities. He undertook a comparison of own-price sales elasticities using three different methods of controlled experiment: an in-store experiment, a trailer store simulation, and personal interviews using showcards. A total of sixteen different price treatments were tested, and elasticities were calculated through linear regression of the logarithms of price and quantity of each product. This is equivalent to estimating a multiplicative model, in which the estimated price parameter is a constant elasticity. Stout's key results are reported in table 1 (he did not name the category or brands involved).

Stout (1969) reported that only the in-store elasticities were statistically significant. Given that the other two techniques also produced some wrongly signed estimates, he claimed that only in-store experiments generated significant and consistently price elasticity estimates. However, Stout interviewed 'shopping housewives' or 'housewives on their way to the supermarket', and did not report any further screening of respondents, despite giving extensive detail on other aspects of his methodology. He also required each respondent in the trailer store simulation to 'behave as if she was in a supermarket shopping for one or more of these' (brands), and each respondent in the personal interview to make 'one or more purchases'. Consequently, the results may have been confounded by the requirement that all respondents make at least one purchase.

We think that this failure to screen out non-buyers may have lead to the problems Stout faced. Non-buyers may well be quite price insensitive when faced with a choice that is unrelated to their regular purchasing behaviour. However, unlike the issue of over-estimates of price effects, an examination of the existing literature does not allow us to resolve the problem. Consequently, in the next section we report on some empirical work of our own to address this issue.

The effect of screening out non-buyers

To examine the effect of the failure to screen out non-buyers, we

used data from a survey-based price experiment which had required responses from all respondents, but had also gathered data on past usage and purchase intention.

Three hundred and eighty two respondents were obtained through a mall intercept procedure. Adult shoppers were randomly approached in the main concourse of a large shopping mall, and taken to a central facility to complete the survey. Each respondent was asked to make successive choices between four brands in each of three categories at a variety of different prices. Showcards were used as the stimuli for each choice, containing pictures of four competing brands with the price of each brand noted below the relevant picture.

The categories actually investigated were chocolate bars, tea, and canned soup, with choices rotated between them. Choices were made at the standard retail prices for each brand, and at price increase and decreases of both 15% and 30% for tea and canned soup and both 10% and 20% for candy bars. While all price changes were not measured for all brands, the design was balanced.

From the design we calculated relative prices, and from the results were able to calculate market share (or strictly, share of choice). This then enabled us to estimate the elasticity for each brand, using the following model.

$$\ln(\text{market share}) = a + b * \ln(\text{relative price})$$

This model is commonly used in the examination of price elasticities, as 'b' is equivalent to price elasticity of market share (eg. Simon 1989, or indeed Stout 1969). The assumption of constant elasticity may not be valid, but this does not matter in this case, as we are interested primarily in the comparison of elasticities from different groups, rather than in the shape of the price response function.

We operationalised a 'buyer' as someone who intended to buy at least once in the next four weeks, and then estimated our model separately for buyers, for all respondents, and for non-buyers. The overall results are summarised in table 2.

Table 2 clearly demonstrates that the inclusion of non-buyers leads to less elastic price estimates, less significant price estimates, and the introduction of positive elasticity estimates. This represents fairly compelling evidence that the problem of non-significant and positive elasticity estimates faced by Stout (1969) and cited by Nagle & Holden (1995, p. 343) is contributed to by the failure to screen out those who do not buy the category being examined.

#### Conclusion

Poor results in validation studies of survey based price experiments have led Nagle & Holden (1995) to conclude that such studies should be used with caution, and should have their results validated by comparison with other types of data.

Caution is always sensible in interpreting the results of pricing research, given the pressure to compromise the realism of the respondents' choice situation to meet budgetary and timing constraints. However, Nagle & Holden's (1995) recommendations for caution were largely based the poor results of validation studies examined in this paper.

An analysis of the methodology of the validation studies, together with consideration of the results of Burke et al (1992) clearly demonstrates that the problem of overstatement of elasticities is contributed to by a failure to include a pictorial representation of the brands involved. Similarly, an analysis of the results of a recent survey-based price experiment demonstrates that the problem of non-significant and positive price elasticities reported by Stout (1969) can be adequately explained by the inappropriate inclusion of non-buyers in the sample.

Consequently, managers should be able to use the results of survey-based price research with greater confidence, so long as they provide some form of pictorial representation, and do not force non-buyers to make a choice. This does not, of course, solve all the potential problems of pricing research, but it does help to address some of the long standing concerns arising from the early validation studies.

This has important practical implications, both for the confidence with which market researchers can offer such pricing research techniques, and for the amount of response data managers are able to gather with a fixed budget.

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Tony Lewis

Department of Marketing, Massey University, Private Bag 11-222, Palmerston North, New Zealand Tony Lewis is an Associate Professor in the Department of Marketing at Massey University with a special interest in the analysis of non-experimental data.

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BURKE, R., HARLAM, B., KAHN, B. & LODISH, L. (1992). Comparing dynamic **consumer** choice in real and computer- **simulated environments** . Journal of **Consumer Research** , 19, June, pp.71-82.

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#### Own-price sales elasticities from Stout (1969)

		Trailer	Personal
Product	In-store simulation	interview	
A	-1.57	-1.25	-0.33
B	-1.27	-0.64	0.71
C	-1.58	-0.76	-1.86
D	-1.74	1.13	0.35
Average	-1.54	-0.38	-0.28

Source: Adapted from Stout (1969).

#### Summary of results

Criteria	Buyers	All buyers	Non-
Average elasticity	-1.85	-1.26	-.84
Significant at p(less than).10	7	5	5
Average 'p' value	.13	.28	.36
Positive elasticities	0	1	3

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INDUSTRY CODES/NAMES: ADV Advertising, Marketing and Public Relations;  
BUSN Any type of business; INTL Business, International  
DESCRIPTORS: Market surveys--Analysis; Pricing--Demographic aspects  
GEOGRAPHIC CODES/NAMES: 4EUUK United Kingdom  
PRODUCT/INDUSTRY NAMES: 9914000 (Marketing)  
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... approached in the main concourse of a large shopping mall, and taken to a central **facility** to complete the survey. Each respondent was asked to make successive choices between four brands...non-experimental data.

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BURKE, R., HARLAM, B., KAHN, B. & LODISH, L. (1992). Comparing dynamic **consumer** choice in real and computer- **simulated environments** . Journal of **Consumer Research** , 19, June, pp. 71-82.  
EHRENBERG, A. & SCRIVEN, J. (1998). Extracts from the R&DI...

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1999

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**The Selection and Pricing of Retail Assortments: An Empirical Approach.**  
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Journal of Retailing, 75, 3, 295  
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#### TEXT:

Determining the best assortment to carry is one of the most central problems in retailing. The key decisions are what items to stock and how to price them. In this article, we develop and test an empirical (or nonparametric) approach that simultaneously addresses the selection and pricing problems. The approach is then applied to the problem of selecting an optimal assortment of backpacks from a field of eight available items. The empirical procedure generates data from a calibration sample of shoppers that we use to determine supposedly optimal assortments (of size  $k = 2, 3, 4$ , and  $5$ ). In a validation analysis on a new sample of shoppers, from the same parent population, it is shown that in this instance the new approach does yield significantly more profitable retail assortments, in all cases (e.g., for all assortment sizes), when compared with more traditional approaches. Additionally, the experimental approach predicts sales and profitability more accurately than traditional approaches.

In most merchandise categories, the number of products available to the retail buyer is plentiful, but retail shelf space is fixed by policy. Therefore, the retail buyer must select and price a subset of items from the available products with the objective of maximizing the contribution from the entire category (Bawa, Landwehr and Krishna 1989; Judd and Vaught 1988; Nielsen 1992). The processes of selecting and pricing are inseparable because maximizing the profit contribution from the whole assortment may not be equivalent to either: 1) maximizing the profits from each item carried (e.g., because of the possibility of improvement from loss leaders, which is a complementary effect), or 2) selecting those individual items that would be the most profitable in isolation (e.g., caused by possible cannibalization within the assortment, which is a substitution effect). In fact, any across-products effects (e.g., cross elasticities) make the consideration of which products to select inseparable from the prices to charge for them.

The problem of developing assortments has been addressed from many different perspectives. Levy and Weitz (1995) define assortment as: "the

number of different items in a merchandise category." Appropriately, an early theoretical view portrayed the problem of assortment from the perspective of the shopper who must trade off the benefit of finding an item, assumed proportional to the number of items carried, to the cost of shopping, assumed proportional to the distance traveled (Baumol and Ide 1956). Recent research has indeed determined that the consumers' perception of assortment attractiveness is based on cues such as: (a) a belief that the preferred item is stocked, (b) the number of SKUs (items) carried, and (c) the amount of space allocated to the category (Broniarczyk, Hoyer, and McAlister 1998). This is important because consumers must choose among the alternative assortments that are available (Kahn and Lehmann 1991) and this is an important determinant of store choice (Arnold, Oum, and Tigert 1983; Craig, Ghosh, and Lafferty 1984; Louviere and Gaeth 1987).

A number of research studies have addressed the assortment problem from the point of view of shelf-space allocation. Early work measured the effect of shelf space on sales in supermarkets (Cox 1970 and Curhan 1972) leading to a modeling literature related to optimizing shelf space allocation (Corstjens and Doyle 1981; Bultez and Naert 1988; Bultez, Gijsbrechts, Naert, and Vanden Abeele 1989; Urban 1998). There are now a number of commercial decision support systems (Apollo from IRI and Spaceman from A.C. Nielsen) that are used to develop planograms in an attempt to improve category performance. Large-scale field experiments have been undertaken in an attempt to measure more exactly space elasticities and cross-elasticities within supermarket categories (Dreze, Hoch, and Purk 1994). Recent modeling and optimization research has begun to address key joint problems of item selection and space allocation (Borin, Farris, and Freeland 1994; Born and Farris 1995), whereas a recent conjoint study tackles the problem of assortment selection and pricing (Green and Savitz 1994).

The ability of the retail buyer to select and price the  $k$  of  $N$  available items that result in the greatest total contribution margin (1) is the focus of this study because, based on the literature, this joint decision is believed to be one of the most central problems in retailing. Whereas shelf management issues such as (a) within category space allocation, (b) merchandise arrangement (whether by brand, size, or alphabetical), and (c) shelf location have been shown to be somewhat important (Bultez and Naert 1988; Corstjens and Doyle 1981; Curhan 1972; Dreze, Hoch, and Purk 1994), these main effects are generally dominated in regard to sales and profit impact by the main effects of pricing (Hoch, Dreze, and Purk 1994). For instance, in the field experiments run by Dominick supermarkets, the shelf management manipulations affected category profits in the 5% to 6% range (Dreze, Hoch, and Purk 1994), whereas the price manipulations of ELDP vs. Hi-Lo had a 32% category profit impact (Hoch, Dreze, and Purk 1994). This suggests the importance of the joint decision of item selection and pricing and that the quality of these joint decisions clearly has a large impact on profitability, customer service levels (e.g., stockouts), inventory control, and customer loyalty (Nielsen 1992). That is why, in the fashion apparel segment of the retail industry, it is not uncommon for 5% to 10% of the open-to-buy budget to be spent on merchandise designated for testing to address the assortment problem (McIntyre and Achabal 1994).

In this article, we use two baseline methods of assortment selection traditionally used by retail buyers to develop a comparison for a new empirically based approach. The two traditional methods are: 1) selecting the best sellers under constant markup from a field test, and 2) econometrically determining the most profitable items by demand curve estimation under the assumption of product independence. It is instructive to consider such naive approaches partly because they highlight the issues that must be confronted in assortment selection and pricing decisions. Discussions with retail buyers and category management specialists (2) indicate that assortment decisions are usually done intuitively and in a two-step process. Item selection is done first followed by pricing at constant markup with possible intuitive adjustments based on specific situational factors (e.g., competition or manufacturer deals). The



empirically based approach we propose attempts to expand on these baseline approaches by allowing for the possibility that product uniqueness (e.g., based on the product's attributes) may be independent of product substitutability (e.g., considering that products with different attributes may be perceived as satisfying the same set of needs). This distinction is well supported and extensively discussed by literature from choice models (Batsell and Polking 1985), market structure analysis (Kalwani, Yim, et al. 1990), and consumer theory (Lancaster 1966, McFadden 1986). From a practical standpoint, the distinction is important because uniqueness affects mostly primary demand, whereas substitution affects mostly secondary demand. Finally, we compare the three methods by calibrating them on one sample of shopper choices, developing supposedly better assortments by each method, and examining the total profitability of each resulting assortment based on a second validation set of shoppers.

#### BACKGROUND

To focus the discussion, consider an example in which a retail buyer is considering eight backpacks from which only three backpacks will be carried and what prices to charge for them. One commonly used and intuitively appealing approach is to price all of the backpacks according to the same policy of standard percentage markup on selling and then to execute a market test by placing all of them together in a set of test stores to determine which ones are the "best sellers." For instance, under this approach, the buyer might place the backpacks in 10 test stores at prices based on 40% markup on selling and observe the following aggregate sales after 2 weeks.

Backpack:	A	B	C	D	E	F	G	H
Price:	\$45	\$43	\$40	\$40	\$36	\$39	\$26	\$36
Test sales (units)	17	25	15	15	22	10	8	12

The buyer's decision, in the "standard markup best sellers" approach, would be to carry B, E, and A because they sold the most units (respectively) and price them at the standard 40% markup used during the test.

#### "Standard-Markup-Best-Sellers" Approach

This "standard markup best sellers" approach is one of the more common approaches used by retailers of fashionable apparel. (3) This approach to the assortment problem has a number of attractive features to the buyer. First, it is very easy to design, run, and interpret the results of the test market. Second, it has seemingly high external validity because it is based on actual purchase behavior. Finally, the "standard markup best sellers" approach will yield close to the profit maximizing assortment when certain conditions regarding the structure of demand are not severely violated as discussed subsequently.

#### "Individual Demand Curves" Approach

To estimate the individual demand curves for each available item, the retailer might run a different type of market test by placing all of the items in a number of test stores while varying the prices on each backpack across stores. In the simplest econometric form of this procedure, the retailer views the reaction to price for each backpack as independent from the prices of other backpacks offered in the store. (4) Upon obtaining a set of sales quantities for each backpack at a range of prices in a set of test stores, a constant elasticity demand relationship can be estimated for each backpack. It is then possible to compute the "profit maximizing" price under the assumption that own-price elasticity does not vary as other products are added/removed from the assortment and estimate the profitability at that price. The retailer might then select the  $k$  most profitable backpacks to include in the assortment priced at their individually determined profit maximizing prices. This is the second procedure that we assess in the empirical section.

#### Market Structure Challenges to Optimal Assortment

There are several key conditions that would make the assortment problem easier to solve in terms of the naive approaches of "best sellers" or "individual demand curves."

##### 1. Invariant Price Elasticity

If price elasticities were independent of which items are carried in

the assortment, then prices could be set optimally by demand curve estimation without distortion and the assortment problem would reduce to being only one of product selection. Under this condition, the profit maximizing price for each item could be computed and would be fixed at that level regardless of what else is in the assortment. To the extent that price elasticities vary with changes in the assortment, not only would the assortment be priced suboptimally, but the items selected may not be the best alternatives.

## 2. Symmetric Substitution

Another important issue has to do with the degree of symmetry in terms of substitution. For the naive approaches to be optimal, the units sold when all items are presented to the consumer would have to be proportional to the units sold when any subset of the items is carried. This essentially would require that the rate of substitution between items be proportional to sales shares as would be consistent with the Luce (1959) model of choice or most of the shelf allocation models (Bultez and Naert 1988). However, what if items C and D, in our example, are almost identical clones while the remaining items are relatively unique? In that case, if D were dropped from the test assortment, the sales of C might have drawn all of the demand of C and D (or about 30 units) making it the first choice instead of leaving both C and D out of the assortment. This is the situation of asymmetric cannibalism as addressed in more recent shelf space literature (Bultez, Gijsbrechts, Naert, and Vanden Abeele 1989) and choice models research (Batsell and Polking 1985).

## 3. Smooth Continuous Demand Functions

Another assumption implied in the invariant elasticity approach is that the demand curves for each item are smooth and well behaved. However, in situations where market demand consists of different segments that value the items differently it is very likely that these aggregate relationships are not smooth and continuous (Merrin 1990; Kalyanam and Shively 1997). For example, consider a situation in which a backpack is highly valued by one segment that might be considered loyal to the product, but is not as highly valued by a second segment. In this situation, the backpack will exhibit low demand at high prices (only the high value, loyal segment purchases), but at some lower price will jump to high demand (as the lower value segment switches to the backpack). To the extent that different segments exist and the value of the backpack is not continuous across segments, the demand relationship will look more like a step function than a smooth function. The profit maximizing prices are at the corners of these steps (i.e., the highest price possible without inducing a segment to switch). This issue is very familiar to the Lancaster view of consumer theory in which quantities sold will be invariant for a range of prices and then exhibit dramatic shifts at the "edges" of the price ranges.

## 4. Fixed Category Demand

Finally, the buyer needs to assess how much of the demand for any items dropped from the assortment would be lost because of shoppers who are loyal to those items and are unwilling to compromise and would instead choose not to buy (as modeled by Borin and Farris 1995).

## Discussion of Market Structure Assumptions

To the extent that: (1) own price elasticities are constant, (2) cross elasticities are symmetric, (3) price change effects are smooth, and (4) total demand stays constant even as items are dropped from or added to the assortment, the naive approaches of "standard markup best sellers" or "demand curve estimation" can be effectively used. The obvious problem is that these assumptions are seldom palatable.

Violations of the first assumption will occur when the market exhibits price elasticities that are a function of the availability and prices of other products. To understand the deeper subtleties of this violation, consider the following example: Suppose that Backpack X and Backpack Y are offered by the retailer and that the relationship between these two items can be represented with a well behaved constant own- and cross-price elasticities model. Then suppose that Backpack Z is brought into the assortment and that it is viewed by shoppers as strictly superior to Backpack X. In such dominance situations, the own-and cross-price

elasticities for Backpack X and Backpack Y, that were estimated without the presence of Backpack Z, will no longer represent the relationship between Backpack X and Backpack Y. As the price of Backpack Y increases, consumers will switch to Backpack Z and not to Backpack X. The dominance issue and other violations of the assumption of constant own- and cross-price elasticities is discussed in choice models that address violations of the Luce Axiom (Batsell and Polking 1985) and in market structure analysis (Bucklin and Srinivasan 1991). In situations where these effects are present, estimating own- and cross-price elasticities must be viewed as valid only for a specified and fixed assortment. Thus, the techniques reduce the assortment problem to a pricing problem where the assortment must be set apriori. If the assortment itself is allowed to vary, the data collection task is prohibitive (as noted by Green and Krieger 1987) because a retailer must test market a range of prices for all pairs of available products, all triples of available products, etc. (5)

The product independence assumption is similar to the assumption made in the majority of the retail assortment literature, whereas the focus in the shelf-space allocation literature is to estimate the own- and cross-space elasticity relationships (e.g., Betancourt and Gautschi 1990; Bultez, Gijsbrechts, Naert, and Vanden Abeele 1989; Corstjens and Doyle 1981; 1983). Although the problem addressed by these models is shelf space allocation, with prices apriori determined, the structure of the models assumes that the space elasticities do not change as one item is allocated zero shelf space (e.g., not included in the assortment). In fact, the potential sales of an item left out of the assortment is typically allocated proportionately across the carried items, implicitly assuming an underlying Luce-type choice model (Luce 1959). Only recently have models emerged that do account jointly for selection issues and space elasticities (e.g., Born and Farris 1994) or using conjoint analysis for selection and price (Green and Savitz 1994).

#### An Empirical Approach

In an effort to develop retail assortments for situations in which the underlying assumptions (1 to 4) may be violated, we have developed an empirically based approach. We begin with a description of the underlying individual consumer choice model assumed by the approach. We then present the market level implications of this choice model.

As a starting point, it should be noted that an "exhaustive" empirical approach exists that will directly determine the optimal assortment regardless of the underlying model of consumer choice. This approach would involve presenting all possible assortments at all possible prices to consumers and merely selecting the alternative with maximum profit. In this manner, it would not be necessary to assume anything about consumer choice processes or about market structure. The problem, obviously, is that the number of assortments constructed in this manner is combinatorially explosive and therefore impractical for actual implementation. Instead, we rely on a simple consumer choice model to deduce the unit sales that will result from any proposed assortment and pricing. A search algorithm can then be used to identify more profitable alternatives.

#### Individual Consumer Choice Model

It is assumed that the consumer has relative preferences across the items within a category based on the items' relative ability to satisfy needs. Also, consumers have a range of needs that they seek to satisfy. When two products satisfy a similar set of needs, the products are viewed as substitutable.

Consumers are viewed as determining a preferred product based upon which one yields the highest valued set of need satisfactions. However, if that product is not available, or priced too high, the consumer will either: 1) not purchase any of the items, or 2) switch to the second most preferred alternative. If the second most preferred alternative is not available, or priced too high, the consumer will once again either not purchase anything or switch to the third most preferred alternative (Bucklin and Srinivasan 1991). This process continues through the set of products possibly resulting in no purchase at all.

The depiction of shoppers compromising their initial preference based upon availability has been the subject of substantial past work (Carpenter and Lehmann 1985; Emmelhainz, Stock, and Emmelhainz 1981; Motes and Castleberry 1985; Walter and Grabner 1975). Such compromising by consumers was found in early surveys. For instance, Peckman (1963) found that 58% of consumers purchased an alternative item when the most preferred item was not available.

However, consumers may also compromise preferred choices because of price. Two views of this process exist, a value perspective (Bucklin and Srinivasan 1991; Mahajan, Green, and Goldberg 1982) and a reservation price perspective (Dobson and Kalish 1988; Kalish and Nelson 1988; Koli and Mahajan 1991). Both of these views have received considerable attention and empirical support in previous research. In the value view, consumers implicitly compute a difference between the price and the utility of the product selecting the one that offers the greatest difference. A purchase will be made as long as at least one item offers a positive difference. Under this perspective, price and product utility are viewed in a compensatory manner, resulting in the possibility that the highest utility item may not be selected if it is highly priced. This approach is commonly used in conjoint analysis (Green and Srinivasan 1978). Under the reservation price approach, the consumer is deemed to examine the most preferred item, and if that item is priced below the consumer's reservation price, a purchase is made. If not, the second item is examined to determine whether it is less than its respective reservation price. The reservation prices for each item are unique and depend upon the value of the need satisfactions produced by the item. Under this perspective, price and product utility are viewed in a noncompensatory manner, resulting in the possibility that high-priced - high-utility items would be selected over "good deal" items. No purchase will be made if none of the products is priced below its respective reservation price.

#### Aggregate Market Demand

Aggregating the individual consumer choice to the market level, if all consumers have the same utility for each individual product and all consumers perceive the product substitutabilities in precisely the same way, then the market demand for each product will be a single-step function. At the other extreme, if every consumer seeks to satisfy different needs, has different utility for each product, and/or perceives substitutability differently, then the steps in the individual demand curves will occur at different price points, possibly resulting in a market demand curve for each product that will approach a smooth function of its price.

However, to the extent that the market is characterized by segments containing similar consumers, but across segment differences, the individual demand steps will "cluster" at certain price points creating "kinked" demand functions. The more substitutable other products are in satisfying the segment's needs, the more the price of the step is dependent on the price of the other product. The greater the number of substitutable products, the larger the set of alternatives within which the segment is willing to compromise initial choice.

Given this view of the market, determination of the optimal assortment requires information about: 1) how much value the market places on each available product including which products are viewed as completely unacceptable, and 2) how the market assesses the substitutability across products based on price. With this information, the profit from any assortment of product/price combinations can be determined while accounting for differing product values, differing views of substitutability, and the possibility of the shopper not purchasing any item from the assortment. The approach captures both the uniqueness and the degree of substitution that are core issues of the assortment problem (Kahn and Lehmann 1991), as well as, the size of the market potential which changes as a result of the product assortment and pricing (Borin and Farris 1994; Bucklin and Srinivasan 1991).

#### RESEARCH DESIGN

The research design consisted of two stages. During the calibration

stage reservation prices and purchases from test assortments were collected. These data were used to develop supposedly optimal assortments that were then presented in a subsequent validation stage to an entirely separate sample drawn from the same parent population.

#### Assortment Development Stage

The purchase of a backpack for personal use was chosen as the domain for the study. A set of eight backpacks from a campus bookstore at a private western university was used from which to select assortments of size  $k=2, 3, 4$ , or  $5$ . In general, these were utility backpacks of different colors and designs as shown in Figure 1. A backpack purchase is a relatively infrequent and high-involvement decision. There are real and apparent differences among the backpacks included in the study and they constitute a shopping good wherein more than one store might be visited before making a purchase. In addition, backpacks are a product category in which almost all purchases are for a single unit from the category.

A convenience sample of 109 students participated in this stage of the study. Each individual student was first shown the entire set of eight backpacks and allowed to inspect them carefully. The student was encouraged to handle the backpacks and become familiar with them as they might in a store. The subject was then put through two tasks to establish a reservation price for each alternative: (1) a direct elicitation of reservation prices followed by (2) an indirect assessment of reservation prices during a simulated shopping exercise. The entire task took between 10 and 35 minutes, with most completing in about 20 minutes.

#### Direct Assessment

For the direct elicitation process, each student was asked to state reservation prices for those backpacks that they might consider buying (as in Bucklin and Srinivasan 1991; Jones 1975). The following questions were used as the student participant actually handled the bags at the research location:

1. Which backpacks would you consider purchasing?
2. Rank order those backpacks according to your preference for them?
3. What is the highest price you would be willing to pay for the most preferred item?
4. What price on each alternative would just cause you to switch to it instead of your most preferred (at the price suggested in 3)?

#### Indirect Assessment

To further refine the stated reservation prices, a simulated shopping experience was used. The participant reviewed a number of choice sets with different prices (see "screen capture" in Figure 1, which is the choice set with all of the items available). These test assortments were created in the following simple way: first, five random assortments were constructed at each  $k$ -level, then, odd-ending prices were selected at random from the range of \$25 to \$49. These sets were presented via a computer screen along with "shelf tags" indicating their prices. The actual backpacks were kept in view on the floor so that the participant could glance at them if desired. The situation would be classified as a "realistic laboratory experiment" as opposed to a "rudimentary experiment" wherein only verbal descriptions are used (in the terminology of Burke, Harlam, Kahn, and Lodish 1992). It was explained that these were the backpacks carried by a given store at the prices shown. The student was asked to either select one of the backpacks to "purchase," if that seemed reasonable given the prices, or to select a "don't buy" option to indicate that none of the backpacks would be acceptable at those prices.

We chose to use actual items rather than verbal descriptions of backpacks (as is common in conjoint studies) for several reasons:

- \* Our approach does not deal with the underlying attributes of items, focusing rather on the whole bundle of attributes that constitutes the item. This can be important for dealing with the interactions among attributes of products as they actually exist in a product category. (6)

- \* Our approach is nonparametric (i.e., all that is estimated are reservation prices for each item) and therefore does not rely on any particular orthogonal array to deal with the efficiency of parameter estimation.

\* It has been found that the realism of the choice stimuli is quite critical to achieving valid results (Srinivasan, Lovejoy, and Beach 1997).

\* Retailers building assortments generally need to select from existing products on the market and, therefore, are not generally in the new product design task when building assortments. (7)

The 32 calibration assortments are shown in Table 1 (see left side under the heading "Test Assortments"). The first choice problem always consisted of all eight backpacks at the prices actually charged in the campus retail store where the backpacks were acquired. This decision provided a warmup for the subject and was the same for all participants. All of the remaining 31 choices were presented in a different random order to each individual. There was a replication presentation of the first assortment in each k-level category to assess choice consistency (indicated in the rows of Table 1 as "Repeat"). Subjects proved to be highly consistent across the "Repeat" replications making the same decision 91.4% of the time (i.e., buy or not buy, and if buy, then the same backpack).

Finally, we established a revised reservation price for each subject as either the stated value from the direct elicitation procedure or the highest observed choice price during the simulated shopping procedure, whichever was higher. The fact that 34% of all stated reservation prices were adjusted by an average of \$4.12, demonstrates the need for the shopping exercise in addition to the direct elicitation of reservation prices.

#### Predicting Assortment Profitability

Given that subjects made highly consistent decisions, we next explored the two alternative individual choice models for predicting the selection of each participant from each calibration assortment based on the subject's revised reservation prices. Formally, these models are:

1. The preference approach (e.g., "best item" rule: choose the most preferred item that is below the reservation price for it, and if no item is below the reservation price then don't buy)

$$(\max_{i \in \{1, \dots, k\}} (R_{sub,i} - P_{sub,i}) / R_{sub,i}) \text{ (greater than)} \\ (P_{sub,i}, 0)$$

Where:

$(R_{sub,i})$  = Reservation price for item  $i$  (epsilon)  $k$

$(P_{sub,i})$  = Price for item  $i$  (epsilon)  $k$

2. The value approach (e.g., "biggest deal" rule: choose the item with the largest percentage reduction from the reservation price, and if no item is below the reservation price, then don't buy)

$$(\max_{i \in \{1, \dots, k\}} (R_{sub,i} - P_{sub,i}) / R_{sub,i}) \text{ (greater than)} \\ (P_{sub,i}, 0)$$

Where:

$(R_{sub,i})$  = Reservation price for item  $i$  (epsilon)  $k$

$(P_{sub,i})$  = Price for item  $i$  (epsilon)  $k$

Rule 1 was the most accurate, correctly predicting the subject's choice in 82.7% of the cases whereas Rule 2 was correct in only 72.0% of all cases. Furthermore, Rule 1 predicted with 94.5% accuracy which backpack would be selected given that the subject did decide to "buy" something. Given the overall dominance of Rule 1 over Rule 2, we only present and discuss the results from Rule 1. It remains for future research to further explore the relative accuracy of these rules in different choice contexts.

We assessed Rule 1 on aggregate predictions of assortment unit sales and profitability as shown in Table 1 (see panels titled "Actual Units" and "Predicted Units"). Most importantly, the choice rule resulted in predicted assortment profitability that correlated highly ( $r = 0.96$ ) with the actual assortment profitability based on the shopping choice exercise. Figure 2 shows this relationship graphically with the assortment profits sorted by actual profit and comparing actual profit to predicted profit.

#### Developing Better Assortments

The primary objective of the calibration stage was to determine more profitable assortments based on the reservation prices and choices observed in that stage. Three strategies were used to develop profitable assortments of size  $k = 2, 3, 4$ , and 5 by the following methods:

\* Use constant markup and select the "best sellers" for alternative

retail margins of 30%, 40%, and 50%.

- \* Use a regression model and determine the "optimal" price based on own price elasticity selecting the most profitable items.

- \* Use Rule 1 as a choice simulator and employ exhaustive search to determine the profit maximizing assortment.

As it turned out, Backpack No. 8 was not selected for any of the supposedly "optimal" assortments, whereas all of the other backpacks appeared in at least one of the newly created assortments.

#### Validation Stage

The "supposedly optimal" assortments (for  $k = 2, 3, 4$  and  $5$ ) derived by the different strategies from the calibration stage (as described above) were then presented to an entirely new sample of students in the validation stage ( $n = 74$ ). The lab procedure for this stage was identical to that used in the calibration stage, except now the assortment stimuli during the simulated shopping experience were the supposedly "optimal" ones (according to the different methods). Table 2 is presented in three parts allowing a drill-down discussion of the results.

Table 2A summarizes the profits for the different supposedly "optimal" assortments developed from each method for each  $k$ -level. In virtually all  $k$ -levels the assortment and prices developed with the 30% markup approach was more profitable than the 40% approach, which was more profitable than the 50% approach. This clearly indicates an elastic demand for the items. The regression approach, which accounts for this elasticity, selected assortments and prices that were more profitable than any of the constant markup assortments and prices. However, the experimental approach generated assortments and prices that were more profitable than all other approaches at all  $k$ -levels examined.

The next question addressed was to assess the extent to which these differences in profitability were due to the alternative methods selecting different items to include in the assortment and/or attributable to differences in prices of the same items. Table 2B shows the items included in the assortment and their prices selected as "optimal" by each method. As seen in Table 2B, the items selected for inclusion significantly differ across methods, particularly for smaller assortments ( $k=2,3$ ). Of particular interest is the difference in items selected across the three constant mark-up methods. Clearly, these pricing schemes are interacting with the assortment selection decision. For larger assortments, there was greater consistency in items selected, although significant differences remain. Comparing the "optimal" prices across methods reveals that not only are there significant differences, but many times the rank order of the prices changes across methods. For example, in  $k=3,4,5$ , the experimental approach, which generated the highest profitability, priced P6 higher than P7, whereas all the other approaches that included both these items priced P6 below P7.

Considering that both the items included and their prices vary significantly across methods underscores the importance of simultaneously selecting and pricing retail assortments. For instance, at a 30% retail margin, the best  $k=3$  assortment was determined to be items P1, P4, and P7, whereas at a 40% retail margin, the best  $k=3$  assortment was items P4, P6, and P7. Continuing with this  $k=3$  result, given that P7 is selected to be in the assortment both the regression and experimental approach suggest the price should be in the \$43 - \$44 range, a price between the 30% and 40% markups. Additionally, the experimental approach, which generated the highest profitability, suggests P7 should be the middle priced item in the  $k=3$  assortment, whereas the remaining approaches suggest it should be the highest priced item. Similar results can be found across Table 2B, which demonstrates a pattern that the "optimal" items to be included in an assortment varies across fixed pricing schemes and the "optimal" prices varies across fixed assortments.

As a final step in the validation stage, we examined the relative accuracy of the different methods in predicting the units "sold" regardless of the method used to develop the assortment. This is important because the retail buyer may need to adjust the assortment and prices attributable to factors not considered here (see limitations section for a discussion of

these factors). In these situations, the retail buyer needs a robust predictive tool regardless of the assortment. Table 2C presents the predicted "sales" from the regression and experimental approaches and the actual units "sold" for all assortments and prices considered, regardless of how the assortment was determined. As shown in Table 2C, the experimental approach more accurately predicts units "sold" than the regression approach. Additionally, the experimental approach predicts the profitability of each assortment more accurately than the regression approach.

Table 3 summarizes the relative predictive accuracy of the Experimental approach compared with the Regression approach in terms of mean absolute deviation (MAD), root-mean-squared-error (RMSE) and correlation with the actual units sold ( $r$ ). Also shown is the MAD improvement percentage of the experimental approach compared with the regression approach. As can be seen, the experimental approach has lower forecast errors in units for all  $k$ -levels and provides more accurate profit predictions with the accuracy improvement, tending to increase with the  $k$ -level.

#### CONCLUSION, IMPLICATIONS, AND FUTURE RESEARCH

Our methodology and research is meant to be an exploratory assessment and possible solution to a common retail assortment approach used by some apparel buyers in what they call "market tests." The approach focuses on one way to include shopper input to the assortment and pricing decision in a meaningful way and follows in the growing tradition of physical and computer-simulated laboratory experiments (Burke, Harlam, Kahn, and Lodish 1992).

The approach might be implemented with shoppers recruited from a store who would participate in a nearby lab setting. Many malls now house marketing research facilities for focus groups and other research purposes that would be adequate to accommodate the type of research suggested herein. Store intercept recruiting would target current store customers and mall intercepts would target the broader group of prospects who are not shoppers but are in the intended segments for the store. After the assortment research data is collected, participants could be further questioned to address segmentation and use-occasion data needs. In an actual implementation of this approach there would need to be careful attention given to these sampling issues. Although clearly a labor-intensive approach, one must determine if the benefits would be worth the costs involved. For small or single-store retailers, the approach may be too expensive, but for large retail chains with hundreds of stores, the research costs may be trivial relative to the systemwide benefits from better planograms.

Another key issue would be the possibility of a self-serving bias from shoppers who might hope to induce the retailer toward lower prices by their answers and simulated choices (which is less of a problem with students in a university lab). A good cover story would be needed to alleviate this problem.

A possible benefit of the approach is that the basic model of choice could be implemented via a decision support system to allow the buyer "what if analysis" about pricing and assortment alternatives. For fast turnaround, the procedure might be implemented at a number of locations via a Web-based approach for the simulated shopping with near instantaneous analysis and results.

There are a number of implications and directions for future research. The current research has addressed only one product category: backpacks. It would seem that the approach is probably most applicable to high involvement, decision-making categories and shopping goods as opposed to frequently purchased, low-involvement, or impulse items. However, this is an issue appropriate to future research. The choice rules used to model consumer decisions would need to be explored carefully because although Rule 1 proved best in our analysis, Rule 2 might be better for other product categories. Also a weighted model based on the two rules or even completely new rules might lead to improvements and/or be required for different categories.



Also, our research has been validated only in a lab-setting and future research should extend validation into an actual store setting. In-store conditions may so distort consumer decisions to invalidate our results. For instance, it may be that higher inventory levels, if kept out in display areas, could positively influence sales that would be an influence different from our lab-based validation sample (Urban 1998). We feel that such an effect would be more expected with impulse and low-involvement goods than shopping goods. This is because with shopping goods:

- \* Shoppers are willing to switch stores
- \* Shelf facings and inventory levels may be less influential than for lower involvement, impulse, or frequently purchased and low-priced items
- \* Consumer introspection is better (favoring the type of direct questioning done herein)

However, more research is needed to assess these observations.

In addition, the generalizability of the findings should be couched in the perspective that the research paradigm is static in nature and does not address the many dynamic aspects of markets. (8) Such dynamics including: (a) competitors who may react to the chosen assortment selection and pricing, and (b) seasonal effects that may alter what is the best selection and pricing over time. These dynamics point to important areas for future research.

With so many possible avenues for future research, a useful approach might be an assessment of retail buyer's current approaches to gain insights into the relative importance of each issue. This may help prioritize the avenues for future investigation as well as to document more extensively what practices are currently in use.

Our focus has been on the joint decisions of item selection and pricing. Most of the literature to date has focused instead on the joint decisions of selection and space allocation. A difficult but needed extension is to bring all three aspects of the assortment problem together including the joint decisions of selection, pricing, and space allocation. Possibly virtual-reality shopping simulations could be used in an experimental design to tackle this three-dimensional optimization problem.

For instance, a key area for future research is to determine how space should be allocated to the category in light of the number of items carried. The retailer could continue to devote the same space to the category regardless of how many items are carried, or might reduce the space when deciding to carry fewer items. Such decisions involve intercategory effects that are beyond the scope of the current study.

In addition, there are a host of more strategic issues that this study does not attempt to address such as the longer run effects of the assortment on store image and store choice. After all, store image and store choice are, in large part, a function of how many items and which ones are carried to say nothing of how they are priced. Clearly, the complexity of the assortment problem is worthy of this special issue of the journal.

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#### NOTES

(1.) Total contribution margin seems the most appropriate goal for the pre-season assortment selection and pricing decision that we deal with here. However, as noted by an anonymous referee, during the purchasing process investment and risk considerations come into play influencing how much to purchase. In those considerations, more complex financial measures such as Gross Margin Return on Investment (GMROI) and Direct Product Profitability (DPP) become more relevant financial measures.

(2.) We interviewed a convenience sample of buyers at five women's specialty chains representing over one thousand stores as well as two category management specialists at a national brand management oriented manufacturer selling a wide variety of consumer products through supermarkets.

(3.) The first author was engaged in developing a retail testing system for a group of women's apparel retail companies and the "best sellers" procedure was used by the buyers at those national chains. In addition, those buyers reported that they had used these procedures at previous jobs when they worked at other retail firms. The buyers did use a certain amount of personal judgment about substitutability, but the "best sellers" approach was the basic procedure for testing and selection.

(4.) A much more elaborate econometric approach could be devised to estimate own- and cross-price elasticities, but the data needed would be untenable in cost and complexity. Our goal is to investigate practical, low cost approaches.

(5.) In the case of eight items, there would be  $((C_{sup.8}).sub.1) + ((C_{sup.8}).sub.2) + ((C_{sup.8}).sub.3) + ((C_{sup.8}).sub.4) + ((C_{sup.8}).sub.5) + ((C_{sup.8}).sub.6) + ((C_{sup.8}).sub.7) + ((C_{sup.8}).sub.8) = 256$  possible assortment combinations. Then if there were five possible prices contemplated for each item the joint combinations explode astronomically.

(6.) For an alternative approach that uses conjoint analysis and real products for retail assortment selection and pricing see Green and Savitz (1994). In that research, item prices and availability were presented in a fractional factorial design for the purposes of estimating conjoint-based utilities for each assortment possibility from the partworths of product availability and prices, respectively.

(7.) When retailers are doing product development, which some do, many other approaches and methods need to be assessed.

(8.) Note that this caveat about market dynamics would apply as well to many other published articles about assortment planning.

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		Actual vs. Predicted Sales								Actual Units
		Test Assortments								(q.sup.1)
		P1	P2	P3	P4	P5	P6	P7	P8	
k = 8 Items	\$40		\$26	\$40	\$40	\$36	\$39	\$43	\$36	23
Repeat	\$40		\$26	\$40	\$40	\$36	\$39	\$43	\$36	24
k = 2 Items	\$41			\$41						58
Repeat	\$41			\$41						58
			\$41	\$43						
	\$31					\$31				81
	\$37		\$29							64
	\$35						\$43			67
k = 3 Items	\$37		\$29					\$35		25
Repeat	\$37		\$29					\$35		19
	\$45						\$39	\$41		10
					\$49	\$29	\$33			
				\$49			\$45	\$43		
	\$29					\$41		\$33		40
k = 4 Items	\$43		\$29			\$49		\$43		16
Repeat	\$43		\$29			\$49		\$43		18
	\$41		\$45		\$45				\$25	58
			\$33		\$35	\$37			\$33	
			\$31	\$31		\$43		\$37		
	\$33		\$45				\$27	\$45		53
k = 5 Items			\$37	\$27	\$49	\$45	\$43			
Repeat			\$37	\$27	\$49	\$45	\$43			
			\$33			\$45	\$43	\$27	\$39	
			\$41	\$45	\$27	\$27			\$41	
	\$33			\$43		\$41	\$33		\$47	62
	\$49				\$49	\$47	\$41	\$31		2
k = 6 Items	\$25		\$39	\$33		\$41		\$37	\$27	65
Repeat	\$25		\$39	\$33		\$41		\$37	\$27	65
	\$37		\$35	\$39		\$43	\$43		\$25	62
			\$45	\$49	\$45	\$35	\$37	\$41		
			\$37	\$45		\$25	\$41	\$43	\$35	
	\$39		\$41	\$33	\$29		\$29		\$33	25
(q.sup.2)		(q.sup.3)	(q.sup.4)	(q.sup.5)	(q.sup.6)	(q.sup.7)				
k = 8 Items	3	4	10		0		13		45	
Repeat	2	2	6		0		11		39	

k = 2 Items	7					
Repeat	9					
1	31					
			2			
3						
				10		
k = 3 Items	1					69
Repeat	1					74
				13		56
		13	1	37		
	2			7		61
			0			58
k = 4 Items	1		0			54
Repeat	3		0			53
	0					
	1	5	0			
	1	41	0			
	1	14	0			72
	0			29		15
k = 5 Items	1	41	6	0	18	
Repeat	0	41	7	0	13	
	1			0	3	98
	2	6	46	3		
		3		0	23	
			3	0	6	87
k = 6 Items	0	8		0		24
Repeat	0	4		0		29
	0	6		0	10	
	1	1	3	1	19	56
	2	1		2	12	52
	0	6	25		33	

Predicted Units

	(q.sup.8)	Profit	(q.sup.1)	(q.sup.2)	(q.sup.3)	(q.sup.4)
k = 8 Items	0	\$1,400	19	3	9	15
Repeat	0	\$1,203	19	3	9	15
k = 2 Items		\$975	51		24	
Repeat		\$1,005	51		24	
		\$551		2	32	
		\$420	90			
		\$740	79	2		
		\$780	70			
k = 3 Items		\$774	22	1		
Repeat		\$743	22	1		
		\$1,098	11			
		\$588				18
		\$1,102			2	
		\$413	35			
k = 4 Items		\$1,097	22	2		
Repeat		\$1,140	22	2		
	0	\$965	54	0		18
	0	\$385		2		45
		\$736		1	24	
		\$675	50	0		
k = 5 Items		\$517		2	42	16
Repeat		\$431		2	42	16
	0	(\$24)		1		
	0	\$219		1	7	55
	0	\$661	55		18	
		\$474	2			15
k = 6 Items	1	\$212	38	0	14	
Repeat	0	\$225	38	0	14	
	1	\$938	51	1	22	
		\$1,072		1	0	17
	0	\$1,033		1	3	

	0	\$562	29	0	12	25
	(q.sup.5)	(q.sup.6)	(q.sup.7)	(q.sup.8)	Profit	
k = 8 Items	0	18	31	0	\$1,342	
Repeat	0	18	31	0	\$1,342	
k = 2 Items					\$1,125	
Repeat					\$1,125	
					\$592	
	1				\$458	
					\$893	
		18			\$948	
k = 3 Items			75		\$783	
Repeat			75		\$783	
		19	55		\$1,186	
	1	39			\$718	
		9	65		\$1,201	
	0		66		\$438	
k = 4 Items	0		58		\$1,271	
Repeat	0		58		\$1,271	
				1	\$1,154	
	0			0	\$437	
	0		65		\$722	
		28	26		\$840	
k = 5 Items	0	16			\$733	
Repeat	0	16			\$733	
	0	10	93	0	\$104	
	3			0	\$223	
	0	24		0	\$875	
	0	12	72		\$798	
k = 6 Items	0		52	0	\$531	
Repeat	0		52	0	\$531	
	0	14		1	\$1,114	
	0	24	46		\$1,231	
	3	20	55	0	\$1,223	
		30		0	\$646	

Note 1: Read as follows: Consider Row 3 of this table, which is an assortment of two products. Product 1 is priced at \$41 and Product 3 is also priced at \$41. The actual units "purchased" in the shopping exercise were 58 units of Product 1 and 7 of Product 3. Based on the reservation price and the use of the choice rule discussed in the text (Rule 1), the predicted units are 51 of Product 1 and 24 of Product 3.

#### Profits by Method

Assortment Method		#Items	30%	40%	50%	Regr	Expr
Assortment Size	k = 2		\$643	\$403	\$252	\$683	\$736
	k = 3		\$662	\$590	\$299	\$725	\$735
	k = 4		\$730	\$773	\$455	\$749	\$809
	k = 5		\$691	\$674	\$403	\$744	\$822

#### Sales and Profits

#### "Optimal" Assortments

k	Method	P1	P2	P3	P4	P5	P6	P7
k = 2	30% Margin				\$37			\$40
	40% Margin				\$43		\$42	
	50% Margin			\$34				\$56
	Regression	\$40						\$44
	Experimental	\$41						\$43
k = 3	30% Margin	\$37			\$37			\$40
	40% Margin				\$43		\$42	\$47
	50% Margin			\$34			\$51	\$56
	Regression	\$40			\$38			\$44
	Experimental	\$41					\$45	\$43
k = 4	30% Margin	\$37			\$37		\$36	\$40
	40% Margin	\$43			\$43		\$42	\$47
	50% Margin	\$52		\$34			\$51	\$56
	Regression	\$40			\$38		\$37	\$44

	Experimental	\$41		\$43		\$45	\$43
k = 5	30% Margin	\$37	\$24	\$37		\$36	\$40
	40% Margin	\$43	\$28	\$43		\$42	\$47
	50% Margin	\$52	\$34	\$52		\$51	\$56
	Regression	\$40		\$36 \$38		\$37	\$44
	Experimental	\$41		\$43	\$31	\$45	\$43

Note: Backpack #8 omitted because it did not appear in any of the "optimal" assortments.

Predicted vs. Actual Units  
Predicted Units  
("Best" Rule)

k	Method	(q.sup.1)	(q.sup.2)	(q.sup.3)	(q.sup.4)	(q.sup.5)
k = 2	30% Margin					13
	40% Margin					13
	50% Margin		3			
	Regression	32				
	Experimental	20				
k = 3	30% Margin	18				13
	40% Margin					12
	50% Margin		3			
	Regression	25				13
	Experimental	20				
k = 4	30% Margin	16				12
	40% Margin	11				11
	50% Margin	1	3			
	Regression	20				13
	Experimental	19		9		
k = 5	30% Margin	15	2			12
	40% Margin	11	3			11
	50% Margin	1	3	0		
	Regression	17		9		11
	Experimental	19		9		2

Predicted Units  
(Regression)

k	(q.sup.6)	(q.sup.7)	Profit	(q.sup.1)	(q.sup.2)	(q.sup.3)
k = 2		41	\$637			
	15		\$471			
		4	\$164		1	
		21	\$785	25		
		40	\$902	23		
k = 3		33	\$739	30		
	13	7	\$554			
	3	3	\$212		1	
		17	\$779	25		
	6	36	\$960	23		
k = 4	15	26	\$781	30		
	13	6	\$705	20		
	3	3	\$238	4	1	
	15	15	\$852	25		
	6	28	\$977	23		5
k = 5	15	26	\$784	30	2	
	13	6	\$738	20	2	
	3	3	\$238	4	1	0
	14	13	\$832	25		10
	6	28	\$993	23		5

Actual Units

k	(q.sup.4)	(q.sup.5)	(q.sup.6)	(q.sup.7)	Profit	(q.sup.1)	(q.sup.2)
k = 2	15			36	\$599		
	9		8		\$286		
				5	\$157		0
				28	\$799	27	
				30	\$797	21	

k = 3	15			36	\$929	21	
	9		8	22	\$705		
			0	5	\$157		0
	14			28	\$967	26	
			5	30	\$895	19	
k = 4	15		14	36	\$1,078	18	
	9		8	22	\$1,045	16	
			0	5	\$261	5	0
	14		13	28	\$1,119	17	
			5	30	\$980	17	
k = 5	15		14	36	\$1,092	16	1
	9		8	22	\$1,068	18	1
			0	5	\$261	4	0
	14		13	28	\$1,219	17	
		1	5	30	\$987	19	
k	(q.sup.3)	(q.sup.4)	(q.sup.5)	(q.sup.6)	(q.sup.7)	Profit	
k = 2		7			47	\$643	
		9		15		\$403	
					9	\$252	
					19	\$683	
					28	\$736	
k = 3		3			33	\$662	
		5		12	16	\$590	
				4	7	\$299	
		6			18	\$725	
				3	26	\$735	
k = 4		3		14	29	\$730	
		2		12	14	\$773	
				5	7	\$455	
		7		16	15	\$749	
	2			5	28	\$809	
k = 5		4		13	27	\$691	
		0		10	10	\$674	
		0		4	7	\$403	
	7	5		13	14	\$744	
	1		4	5	26	\$822	

Note: Backpack #8 omitted because it did not appear in any of the "optimal" assortments.

		Units				Predictive Accuracy Profits			
		MAD	RMSE	r	MAD % Better	MAD	RMSE	r	MAD % Better
All	Expr	3.57	4.71	0.885		105	120	0.951	
	Regr	4.90	6.31	0.867	27%	215	247	0.924	51%
k = 2	Expr	4.40	5.44	0.922		86	100	0.975	
	Regr	4.60	5.87	0.890	4%	87	91	0.980	0%
k = 3	Expr	4.07	5.34	0.868		96	117	0.966	
	Regr	4.93	5.91	0.908	18%	185	194	0.925	48%
k = 4	Expr	3.55	4.53	0.833		114	135	0.970	
	Regr	5.25	6.53	0.869	32%	271	283	0.943	58%
k = 5	Expr	2.96	4.10	0.857		116	124	0.998	
	Regr	4.72	6.52	0.880	37%	315	343	0.882	63%

1. MAD = Mean Absolute Deviation (predicted vs. actual)

2. RMSE = Root Mean Squared Error (predicted vs. actual)

3. r = correlation (predicted vs. actual)

5. MAD % Better = % improvement by experimental approach compared to regression approach.

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INDUSTRY CODES/NAMES: BUSN Any type of business; RETL Retailing  
 DESCRIPTORS: Retail industry--Marketing  
 GEOGRAPHIC CODES/NAMES: 1USA United States  
 PRODUCT/INDUSTRY NAMES: 5200000 (Retail Trade)



EVENT CODES/NAMES: 240 Marketing procedures  
FILE SEGMENT: TI File 148

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File 2:INSPEC 1969-2003/Aug W4  
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Set	Items	Description
S1	4954	ENVIRONMENT?? (10N) (MOCK OR SIMULATED OR SIMULATING OR IM-ITAT?)
S2	5429	CONSUMER (10N) (SEARCH OR RESEARCH)
S3	4029	TESTING (10N) PRODUCT
S4	0	S1 (S) S2 (S) S3
S5	1	S1 (S) S2
S6	0	S5 AND S3
S7	134368	FACILITY
S8	125	S1 AND S7
S9	1	S8 AND S2
S10	0	S9 AND S3
S11	1	S5 AND S7
S12	2	S1 AND S2
S13	0	S3 AND S12
S14	24	S7 AND S2
S15	1	S1 AND S14
S16	0	S14 AND S3
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9/9,K/16 (Item 8 from file: 148)

DIALOG(R) File 148:Gale Group Trade & Industry DB

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04500298 SUPPLIER NUMBER: 08295421 (THIS IS THE FULL TEXT)

**Rubbermaid gets a handle on mops and brooms. (Rubbermaid Inc.)**

Gray, Victoria

HFD-The Weekly Home Furnishings Newspaper, v64, n3, p132(2)

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Rubbermaid gets a handle on mops and brooms

WOOSTER, Ohio - Rubbermaid Inc. is banking on its proven brand name, cross-merchandising capabilities and advertising know-how to propel its latest home cleanup venture - a full line of brooms, mops, brushes and sponges - to the forefront of the \$1 billion stick goods and smallwares category.

The plastics giant's program, which is making its debut at this week's International Housewares Exposition in Chicago, is generating considerable interest among retailers and manufacturers. Rubbermaid is entering the category with the same vigor and marketing savvy it did with food storage products six years ago and recycling containers last August.

"Our philosophy as a business is to bring to the customer a complete package - a total marketing mix program rather than a product and price," noted Wolf Schmitt, president and general manager of the housewares products division at Rubbermaid. "Our concept is not just to sell in, but to bring to the retailers a package that both sells in and sells out."

The company's home cleanup team, which also includes Raymond Pezzi, vice president of marketing, Andrius Birutis, product manager, and Porter Kauffman, national sales manager, has spent three years conducting extensive **consumer** and retail **research** and gathering statistics and other data on markets, programs, products, features and colors.

Based on those studies, the company has developed a product line of 50 basic items in the broom, mop, brush and sponge categories. The products, which come in bright blue with coordinated black packaging, will ship to retailers early in the second half of this year. The company also plans to incorporate rubber gloves and vacuum cleaner bags into the program.

According to Rubbermaid, the cleaning aids business, which generates about \$675 million at wholesale (\$300 million in brooms, brushes and mops; \$200 million in sponges, scrubbers and wipes; \$55 million in rubber gloves, and \$120 million in vacuum cleaner bags), needs to be reinvigorated.

"Other than repackaging existing lines, when you look at the business over the last 10 or 20 years, it's not had any great investment of creativity or resources," Schmitt said. "The product lines have been developed over many, many years so, as a result, there's a real hodgepodge of product. The quality is very inconsistent."

In creating its line, Rubbermaid used resources from two subsidiaries - Viking Brush Ltd. in Canada, which is a full-line operation, and Rubbermaid Commercial Products. All items except rubber gloves, which are imported, are being manufactured at various locations in North America.

While manufacturing plants are scattered, the company has centralized distribution, using one **facility** in Statesville, N.C. "We have chosen to centralize this product in order to respond a lot quicker to retailers' needs," Kauffman noted, adding that "this category turns a lot faster than other categories we're experienced in."

Drawing from these resources is just one of many strategic advantages the company has, Schmitt noted. Rubbermaid's stamp of approval from consumers will help to move the products.

"We think that in the '90s our customers will more than ever look for destination brands that they know will pull consumers into their stores," Schmitt said. "We happen to be one of those companies that fit this description."

The potential to cross-merchandise the line with similar cleaning products already in the company's mix, such as refuse containers, buckets and laundry baskets, is appealing to retailers, said Pezzi.

"There's a tremendous synergy with Rubbermaid and cleaning," he said. "There are great opportunities with tie-in promotions. Retailers are looking at purchasing from companies that can supply their needs, and present themselves in a cohesive manner without fragmentation."

A retailer, for example, may promote Rubbermaid buckets and mops on an end-cap display to drive sales.

"Retailers are excited about the possibility of integrating what we currently do with our cleaning products," Kauffman said. "It will drive incremental volume for retailers."

To draw consumers into the stores, Rubbermaid's program will be backed by a national television, print and radio advertising campaign. The company will advertise the line by itself as well as integrate it with other home cleanup products.

Rubbermaid, which is celebrating its 70th anniversary, will spend more money on advertising this year than ever before. The Rubbermaid name will reach each adult 63 times in 1990, making 11 billion impressions in all.

While assessing the category, Rubbermaid found too many products can be a problem for retailers. "Right now an awful lot of retailers have way too many SKUs and as a result they simply can't service them all," said Pezzi.

To avoid this problem, the company conducted retail store audits, looking at every single product in the line. Based on this information it was able to develop a program that includes the key products in an average retail planogram.

"We will be expanding our product selection to meet more and more needs, and we will be developing new types of products that will be unique to the marketplace," said Birutis.

Prices on products range from \$1.29 for a sponge scrubber to \$15.99 for a push broom. "We are extremely competitive with those people who deliver a quality product and are at the top of this market," Schmitt said, adding that "price is not a major driver with a lot of consumers today; it's quality that's important."

In designing the line, the team literally started from scratch. And as it does with all products, Birutis noted, Rubbermaid paid tremendous attention to details. "We looked at each element of a product and tried to give it advantages over what's out there now," he said.

Schmitt added, "We have a tremendous number of little advantages. If you add them all up you have a significant advantage, we think, competitively."

For example, Rubbermaid talked to numerous chemical cleaning companies and found that certain colors connote different values to consumers. Pastel colors, for example, connote lighter cleaning. Primary colors, on the other hand, are associated with heavier cleaning. "Blue was the dominate theme in our studies," Schmitt said. "It connotes crisp, strong cleaning to the consumer."

The company also stressed ergonomics while developing the line. "Most people hate to clean. When designing these products we tried to do everything we could to make cleaning easier for consumers," noted Birutis.

"Quality is related to convenience," he added.

To make cleaning easier for consumers, handles were contoured to fit comfortably in the hand without pinching. On scrub brushes, for example, the handles are open instead of closed to fit any size or shape hand. Pot scrubbers are angled to fit easily inside cookware. On wet mops, the yarn is sewn into the piece that connects it to the stick. This is to keep the yarn from falling out.

Brooms have been angled to fit into tight corners and bristles are soft in order to pick up dirt more easily. The brooms are also lightweight to make cleaning easier. The edges of dust pans are serrated so that consumers can clean the dust off the brush. The list goes on and on.

The same attention has been paid to packaging. Rubbermaid actually took consumers through a **simulated** store **environment** to determine how long they look at a planogram, what they look at and how much copy they read. "We found that consumers zero in on what the brand is and what the product is," said Birutis. The company, therefore, made the red Rubbermaid logo and the product description, in white, much larger than usual.

"There's low readership on copy so we played up what consumers want to see to create shelf impact," he said, adding that the carding contains brief descriptions of products and features in yellow.

PHOTO : The bristles on Rubbermaid's brooms are softer to pick up dust and dirt more easily.

PHOTO : Handles on brushes are contoured to fit the hand.

PHOTO : Squeezing actions have been improved on sponge mops, and the yarn on wet mops have been stitched-in to prevent it from falling out.

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SPECIAL FEATURES: illustration; photograph

COMPANY NAMES: Rubbermaid Inc.--Product introduction

INDUSTRY CODES/NAMES: HOME Home Furnishings

DESCRIPTORS: Broom and brush industry--Marketing

SIC CODES: 3991 Brooms and brushes

FILE SEGMENT: TI File 148

... Birutis, product manager, and Porter Kauffman, national sales manager, has spent three years conducting extensive **consumer** and retail **research** and gathering statistics and other data on markets, programs, products, features and colors.

Based on...

...in North America.

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9/9,K/15 (Item 7 from file: 148)  
 DIALOG(R)File 148:Gale Group Trade & Industry DB  
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11772533 SUPPLIER NUMBER: 58065166 (THIS IS THE FULL TEXT)  
**The Selection and Pricing of Retail Assortments: An Empirical Approach.**  
 MCINTYRE, SHELBY H.; MILLER, CHRISTOPHER M.  
 Journal of Retailing, 75, 3, 295  
 Fall, 1999  
 ISSN: 0022-4359 LANGUAGE: English RECORD TYPE: Fulltext  
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TEXT:

Determining the best assortment to carry is one of the most central problems in retailing. The key decisions are what items to stock and how to price them. In this article, we develop and test an empirical (or nonparametric) approach that simultaneously addresses the selection and pricing problems. The approach is then applied to the problem of selecting an optimal assortment of backpacks from a field of eight available items. The empirical procedure generates data from a calibration sample of shoppers that we use to determine supposedly optimal assortments (of size  $k = 2, 3, 4$ , and  $5$ ). In a validation analysis on a new sample of shoppers, from the same parent population, it is shown that in this instance the new approach does yield significantly more profitable retail assortments, in all cases (e.g., for all assortment sizes), when compared with more traditional approaches. Additionally, the experimental approach predicts sales and profitability more accurately than traditional approaches.

In most merchandise categories, the number of products available to the retail buyer is plentiful, but retail shelf space is fixed by policy. Therefore, the retail buyer must select and price a subset of items from the available products with the objective of maximizing the contribution from the entire category (Bawa, Landwehr and Krishna 1989; Judd and Vaught 1988; Nielsen 1992). The processes of selecting and pricing are inseparable because maximizing the profit contribution from the whole assortment may not be equivalent to either: 1) maximizing the profits from each item carried (e.g., because of the possibility of improvement from loss leaders, which is a complementary effect), or 2) selecting those individual items that would be the most profitable in isolation (e.g., caused by possible cannibalization within the assortment, which is a substitution effect). In fact, any across-products effects (e.g., cross elasticities) make the consideration of which products to select inseparable from the prices to charge for them.

The problem of developing assortments has been addressed from many different perspectives. Levy and Weitz (1995) define assortment as: "the number of different items in a merchandise category." Appropriately, an early theoretical view portrayed the problem of assortment from the perspective of the shopper who must trade off the benefit of finding an item, assumed proportional to the number of items carried, to the cost of shopping, assumed proportional to the distance traveled (Baumol and Ide 1956). Recent research has indeed determined that the consumers' perception of assortment attractiveness is based on cues such as: (a) a belief that the preferred item is stocked, (b) the number of SKUs (items) carried, and (c) the amount of space allocated to the category (Broniarczyk, Hoyer, and McAlister 1998). This is important because consumers must choose among the alternative assortments that are available (Kahn and Lehmann 1991) and this is an important determinant of store choice (Arnold, Oum, and Tigert 1983; Craig, Ghosh, and Lafferty 1984; Louviere and Gaeth 1987).

A number of research studies have addressed the assortment problem from the point of view of shelf-space allocation. Early work measured the effect of shelf space on sales in supermarkets (Cox 1970 and Curhan 1972) leading to a modeling literature related to optimizing shelf space allocation (Corstjens and Doyle 1981; Bultez and Naert 1988; Bultez, Gijbrenchts, Naert, and Vanden Abeele 1989; Urban 1998). There are now a number of commercial decision support systems (Apollo from IRI and Spaceman

from A.C. Nielsen) that are used to develop planograms in an attempt to improve category performance. Large-scale field experiments have been undertaken in an attempt to measure more exactly space elasticities and cross-elasticities within supermarket categories (Dreze, Hoch, and Purk 1994). Recent modeling and optimization research has begun to address key joint problems of item selection and space allocation (Borin, Farris, and Freeland 1994; Born and Farris 1995), whereas a recent conjoint study tackles the problem of assortment selection and pricing (Green and Savitz 1994).

The ability of the retail buyer to select and price the  $k$  of  $N$  available items that result in the greatest total contribution margin (1) is the focus of this study because, based on the literature, this joint decision is believed to be one of the most central problems in retailing. Whereas shelf management issues such as (a) within category space allocation, (b) merchandise arrangement (whether by brand, size, or alphabetical), and (c) shelf location have been shown to be somewhat important (Bultez and Naert 1988; Corstjens and Doyle 1981; Curhan 1972; Dreze, Hoch, and Purk 1994), these main effects are generally dominated in regard to sales and profit impact by the main effects of pricing (Hoch, Dreze, and Purk 1994). For instance, in the field experiments run by Dominick supermarkets, the shelf management manipulations affected category profits in the 5% to 6% range (Dreze, Hoch, and Purk 1994), whereas the price manipulations of ELDP vs. Hi-Lo had a 32% category profit impact (Hoch, Dreze, and Punk 1994). This suggests the importance of the joint decision of item selection and pricing and that the quality of these joint decisions clearly has a large impact on profitability, customer service levels (e.g., stockouts), inventory control, and customer loyalty (Nielsen 1992). That is why, in the fashion apparel segment of the retail industry, it is not uncommon for 5% to 10% of the open-to-buy budget to be spent on merchandise designated for testing to address the assortment problem (McIntyre and Achabal 1994).

In this article, we use two baseline methods of assortment selection traditionally used by retail buyers to develop a comparison for a new empirically based approach. The two traditional methods are: 1) selecting the best sellers under constant markup from a field test, and 2) econometrically determining the most profitable items by demand curve estimation under the assumption of product independence. It is instructive to consider such naive approaches partly because they highlight the issues that must be confronted in assortment selection and pricing decisions. Discussions with retail buyers and category management specialists (2) indicate that assortment decisions are usually done intuitively and in a two-step process. Item selection is done first followed by pricing at constant markup with possible intuitive adjustments based on specific situational factors (e.g., competition or manufacturer deals). The empirically based approach we propose attempts to expand on these baseline approaches by allowing for the possibility that product uniqueness (e.g., based on the product's attributes) may be independent of product substitutability (e.g., considering that products with different attributes may be perceived as satisfying the same set of needs). This distinction is well supported and extensively discussed by literature from choice models (Batsell and Polking 1985), market structure analysis (Kalwani, Yim, et al. 1990), and consumer theory (Lancaster 1966, McFadden 1986). From a practical standpoint, the distinction is important because uniqueness affects mostly primary demand, whereas substitution affects mostly secondary demand. Finally, we compare the three methods by calibrating them on one sample of shopper choices, developing supposedly better assortments by each method, and examining the total profitability of each resulting assortment based on a second validation set of shoppers.

#### BACKGROUND

To focus the discussion, consider an example in which a retail buyer is considering eight backpacks from which only three backpacks will be carried and what prices to charge for them. One commonly used and intuitively appealing approach is to price all of the backpacks according to the same policy of standard percentage markup on selling and then to

execute a market test by placing all of them together in a set of test stores to determine which ones are the "best sellers." For instance, under this approach, the buyer might place the backpacks in 10 test stores at prices based on 40% markup on selling and observe the following aggregate sales after 2 weeks.

Backpack:	A	B	C	D	E	F	G	H
Price:	\$45	\$43	\$40	\$40	\$36	\$39	\$26	\$36
Test sales (units)	17	25	15	15	22	10	8	12

The buyer's decision, in the "standard markup best sellers" approach, would be to carry B, E, and A because they sold the most units (respectively) and price them at the standard 40% markup used during the test.

#### "Standard-Markup-Best-Sellers" Approach

This "standard markup best sellers" approach is one of the more common approaches used by retailers of fashionable apparel. (3) This approach to the assortment problem has a number of attractive features to the buyer. First, it is very easy to design, run, and interpret the results of the test market. Second, it has seemingly high external validity because it is based on actual purchase behavior. Finally, the "standard markup best sellers" approach will yield close to the profit maximizing assortment when certain conditions regarding the structure of demand are not severely violated as discussed subsequently.

#### "Individual Demand Curves" Approach

To estimate the individual demand curves for each available item, the retailer might run a different type of market test by placing all of the items in a number of test stores while varying the prices on each backpack across stores. In the simplest econometric form of this procedure, the retailer views the reaction to price for each backpack as independent from the prices of other backpacks offered in the store. (4) Upon obtaining a set of sales quantities for each backpack at a range of prices in a set of test stores, a constant elasticity demand relationship can be estimated for each backpack. It is then possible to compute the "profit maximizing" price under the assumption that own-price elasticity does not vary as other products are added/removed from the assortment and estimate the profitability at that price. The retailer might then select the k most profitable backpacks to include in the assortment priced at their individually determined profit maximizing prices. This is the second procedure that we assess in the empirical section.

#### Market Structure Challenges to Optimal Assortment

There are several key conditions that would make the assortment problem easier to solve in terms of the naive approaches of "best sellers" or "individual demand curves."

##### 1. Invariant Price Elasticity

If price elasticities were independent of which items are carried in the assortment, then prices could be set optimally by demand curve estimation without distortion and the assortment problem would reduce to being only one of product selection. Under this condition, the profit maximizing price for each item could be computed and would be fixed at that level regardless of what else is in the assortment. To the extent that price elasticities vary with changes in the assortment, not only would the assortment be priced suboptimally, but the items selected may not be the best alternatives.

##### 2. Symmetric Substitution

Another important issue has to do with the degree of symmetry in terms of substitution. For the naive approaches to be optimal, the units sold when all items are presented to the consumer would have to be proportional to the units sold when any subset of the items is carried. This essentially would require that the rate of substitution between items be proportional to sales shares as would be consistent with the Luce (1959) model of choice or most of the shelf allocation models (Bultez and Naert 1988). However, what if items C and D, in our example, are almost identical clones while the remaining items are relatively unique? In that case, if D were dropped from the test assortment, the sales of C might have drawn all of the demand of C and D (or about 30 units) making it the first choice



instead of leaving both C and D out of the assortment. This is the situation of asymmetric cannibalism as addressed in more recent shelf space literature (Bultez, Gijsbrechts, Naert, and Vanden Abeele 1989) and choice models research (Batsell and Polking 1985).

### 3. Smooth Continuous Demand Functions

Another assumption implied in the invariant elasticity approach is that the demand curves for each item are smooth and well behaved. However, in situations where market demand consists of different segments that value the items differently it is very likely that these aggregate relationships are not smooth and continuous (Merrin 1990; Kalyanam and Shively 1997). For example, consider a situation in which a backpack is highly valued by one segment that might be considered loyal to the product, but is not as highly valued by a second segment. In this situation, the backpack will exhibit low demand at high prices (only the high value, loyal segment purchases), but at some lower price will jump to high demand (as the lower value segment switches to the backpack). To the extent that different segments exist and the value of the backpack is not continuous across segments, the demand relationship will look more like a step function than a smooth function. The profit maximizing prices are at the corners of these steps (i.e., the highest price possible without inducing a segment to switch). This issue is very familiar to the Lancaster view of consumer theory in which quantities sold will be invariant for a range of prices and then exhibit dramatic shifts at the "edges" of the price ranges.

### 4. Fixed Category Demand

Finally, the buyer needs to assess how much of the demand for any items dropped from the assortment would be lost because of shoppers who are loyal to those items and are unwilling to compromise and would instead choose not to buy (as modeled by Borin and Farris 1995).

### Discussion of Market Structure Assumptions

To the extent that: (1) own price elasticities are constant, (2) cross elasticities are symmetric, (3) price change effects are smooth, and (4) total demand stays constant even as items are dropped from or added to the assortment, the native approaches of "standard markup best sellers" or "demand curve estimation" can be effectively used. The obvious problem is that these assumptions are seldom palatable.

Violations of the first assumption will occur when the market exhibits price elasticities that are a function of the availability and prices of other products. To understand the deeper subtleties of this violation, consider the following example: Suppose that Backpack X and Backpack Y are offered by the retailer and that the relationship between these two items can be represented with a well behaved constant own- and cross-price elasticities model. Then suppose that Backpack Z is brought into the assortment and that it is viewed by shoppers as strictly superior to Backpack X. In such dominance situations, the own- and cross-price elasticities for Backpack X and Backpack Y, that were estimated without the presence of Backpack Z, will no longer represent the relationship between Backpack X and Backpack Y. As the price of Backpack Y increases, consumers will switch to Backpack Z and not to Backpack X. The dominance issue and other violations of the assumption of constant own- and cross-price elasticities is discussed in choice models that address violations of the Luce Axiom (Batsell and Polking 1985) and in market structure analysis (Bucklin and Srinivasan 1991). In situations where these effects are present, estimating own- and cross-price elasticities must be viewed as valid only for a specified and fixed assortment. Thus, the techniques reduce the assortment problem to a pricing problem where the assortment must be set a priori. If the assortment itself is allowed to vary, the data collection task is prohibitive (as noted by Green and Krieger 1987) because a retailer must test market a range of prices for all pairs of available products, all triples of available products, etc. (5)

The product independence assumption is similar to the assumption made in the majority of the retail assortment literature, whereas the focus in the shelf-space allocation literature is to estimate the own- and cross-space elasticity relationships (e.g., Betancourt and Gautschi 1990; Bultez, Gijsbrechts, Naert, and Vanden Abeele 1989; Corstjens and Doyle

1981; 1983). Although the problem addressed by these models is shelf space allocation, with prices apriori determined, the structure of the models assumes that the space elasticities do not change as one item is allocated zero shelf space (e.g., not included in the assortment). In fact, the potential sales of an item left out of the assortment is typically allocated proportionately across the carried items, implicitly assuming an underlying Luce-type choice model (Luce 1959). Only recently have models emerged that do account jointly for selection issues and space elasticities (e.g., Born and Farris 1994) or using conjoint analysis for selection and price (Green and Savitz 1994).

#### An Empirical Approach

In an effort to develop retail assortments for situations in which the underlying assumptions (1 to 4) may be violated, we have developed an empirically based approach. We begin with a description of the underlying individual consumer choice model assumed by the approach. We then present the market level implications of this choice model.

As a starting point, it should be noted that an "exhaustive" empirical approach exists that will directly determine the optimal assortment regardless of the underlying model of consumer choice. This approach would involve presenting all possible assortments at all possible prices to consumers and merely selecting the alternative with maximum profit. In this manner, it would not be necessary to assume anything about consumer choice processes or about market structure. The problem, obviously, is that the number of assortments constructed in this manner is combinatorially explosive and therefore impractical for actual implementation. Instead, we rely on a simple consumer choice model to deduce the unit sales that will result from any proposed assortment and pricing. A search algorithm can then be used to identify more profitable alternatives.

#### Individual Consumer Choice Model

It is assumed that the consumer has relative preferences across the items within a category based on the items' relative ability to satisfy needs. Also, consumers have a range of needs that they seek to satisfy. When two products satisfy a similar set of needs, the products are viewed as substitutable.

Consumers are viewed as determining a preferred product based upon which one yields the highest valued set of need satisfactions. However, if that product is not available, or priced too high, the consumer will either: 1) not purchase any of the items, or 2) switch to the second most preferred alternative. If the second most preferred alternative is not available, or priced too high, the consumer will once again either not purchase anything or switch to the third most preferred alternative (Bucklin and Srinivasan 1991). This process continues through the set of products possibly resulting in no purchase at all.

The depiction of shoppers compromising their initial preference based upon availability has been the subject of substantial past work (Carpenter and Lehmann 1985; Emmelhainz, Stock, and Emmelhainz 1981; Motes and Castleberry 1985; Walter and Grabner 1975). Such compromising by consumers was found in early surveys. For instance, Peckman (1963) found that 58% of consumers purchased an alternative item when the most preferred item was not available.

However, consumers may also compromise preferred choices because of price. Two views of this process exist, a value perspective (Bucklin and Srinivasan 1991; Mahajan, Green, and Goldberg 1982) and a reservation price perspective (Dobson and Kalish 1988; Kalish and Nelson 1988; Koli and Mahajan 1991). Both of these views have received considerable attention and empirical support in previous research. In the value view, consumers implicitly compute a difference between the price and the utility of the product selecting the one that offers the greatest difference. A purchase will be made as long as at least one item offers a positive difference. Under this perspective, price and product utility are viewed in a compensatory manner, resulting in the possibility that the highest utility item may not be selected if it is highly priced. This approach is commonly used in conjoint analysis (Green and Srinivasan 1978). Under the

reservation price approach, the consumer is deemed to examine the most preferred item, and if that item is priced below the consumer's reservation price, a purchase is made. If not, the second item is examined to determine whether it is less than its respective reservation price. The reservation prices for each item are unique and depend upon the value of the need satisfactions produced by the item. Under this perspective, price and product utility are viewed in a noncompensatory manner, resulting in the possibility that high-priced - high-utility items would be selected over "good deal" items. No purchase will be made if none of the products is priced below its respective reservation price.

#### Aggregate Market Demand

Aggregating the individual consumer choice to the market level, if all consumers have the same utility for each individual product and all consumers perceive the product substitutabilities in precisely the same way, then the market demand for each product will be a single-step function. At the other extreme, if every consumer seeks to satisfy different needs, has different utility for each product, and/or perceives substitutability differently, then the steps in the individual demand curves will occur at different price points, possibly resulting in a market demand curve for each product that will approach a smooth function of its price.

However, to the extent that the market is characterized by segments containing similar consumers, but across segment differences, the individual demand steps will "cluster" at certain price points creating "kinked" demand functions. The more substitutable other products are in satisfying the segment's needs, the more the price of the step is dependent on the price of the other product. The greater the number of substitutable products, the larger the set of alternatives within which the segment is willing to compromise initial choice.

Given this view of the market, determination of the optimal assortment requires information about: 1) how much value the market places on each available product including which products are viewed as completely unacceptable, and 2) how the market assesses the substitutability across products based on price. With this information, the profit from any assortment of product/price combinations can be determined while accounting for differing product values, differing views of substitutability, and the possibility of the shopper not purchasing any item from the assortment. The approach captures both the uniqueness and the degree of substitution that are core issues of the assortment problem (Kahn and Lehmann 1991), as well as, the size of the market potential which changes as a result of the product assortment and pricing (Borin and Farris 1994; Bucklin and Srinivasan 1991).

#### RESEARCH DESIGN

The research design consisted of two stages. During the calibration stage reservation prices and purchases from test assortments were collected. These data were used to develop supposedly optimal assortments that were then presented in a subsequent validation stage to an entirely separate sample drawn from the same parent population.

#### Assortment Development Stage

The purchase of a backpack for personal use was chosen as the domain for the study. A set of eight backpacks from a campus bookstore at a private western university was used from which to select assortments of size  $k=2, 3, 4$ , or  $5$ . In general, these were utility backpacks of different colors and designs as shown in Figure 1. A backpack purchase is a relatively infrequent and high-involvement decision. There are real and apparent differences among the backpacks included in the study and they constitute a shopping good wherein more than one store might be visited before making a purchase. In addition, backpacks are a product category in which almost all purchases are for a single unit from the category.

A convenience sample of 109 students participated in this stage of the study. Each individual student was first shown the entire set of eight backpacks and allowed to inspect them carefully. The student was encouraged to handle the backpacks and become familiar with them as they might in a store. The subject was then put through two tasks to establish a

reservation price for each alternative: (1) a direct elicitation of reservation prices followed by (2) an indirect assessment of reservation prices during a simulated shopping exercise. The entire task took between 10 and 35 minutes, with most completing in about 20 minutes.

#### Direct Assessment

For the direct elicitation process, each student was asked to state reservation prices for those backpacks that they might consider buying (as in Bucklin and Srinivasan 1991; Jones 1975). The following questions were used as the student participant actually handled the bags at the research location:

1. Which backpacks would you consider purchasing?
2. Rank order those backpacks according to your preference for them?
3. What is the highest price you would be willing to pay for the most preferred item?
4. What price on each alternative would just cause you to switch to it instead of your most preferred (at the price suggested in 3)?

#### Indirect Assessment

To further refine the stated reservation prices, a simulated shopping experience was used. The participant reviewed a number of choice sets with different prices (see "screen capture" in Figure 1, which is the choice set with all of the items available). These test assortments were created in the following simple way: first, five random assortments were constructed at each k-level, then, odd-ending prices were selected at random from the range of \$25 to \$49. These sets were presented via a computer screen along with "shelf tags" indicating their prices. The actual backpacks were kept in view on the floor so that the participant could glance at them if desired. The situation would be classified as a "realistic laboratory experiment" as opposed to a "rudimentary experiment" wherein only verbal descriptions are used (in the terminology of Burke, Harlam, Kahn, and Lodish 1992). It was explained that these were the backpacks carried by a given store at the prices shown. The student was asked to either select one of the backpacks to "purchase," if that seemed reasonable given the prices, or to select a "don't buy" option to indicate that none of the backpacks would be acceptable at those prices.

We chose to use actual items rather than verbal descriptions of backpacks (as is common in conjoint studies) for several reasons:

- \* Our approach does not deal with the underlying attributes of items, focusing rather on the whole bundle of attributes that constitutes the item. This can be important for dealing with the interactions among attributes of products as they actually exist in a product category. (6)

- \* Our approach is nonparametric (i.e., all that is estimated are reservation prices for each item) and therefore does not rely on any particular orthogonal array to deal with the efficiency of parameter estimation.

- \* It has been found that the realism of the choice stimuli is quite critical to achieving valid results (Srinivasan, Lovejoy, and Beach 1997).

- \* Retailers building assortments generally need to select from existing products on the market and, therefore, are not generally in the new product design task when building assortments. (7)

The 32 calibration assortments are shown in Table 1 (see left side under the heading "Test Assortments"). The first choice problem always consisted of all eight backpacks at the prices actually charged in the campus retail store where the backpacks were acquired. This decision provided a warmup for the subject and was the same for all participants. All of the remaining 31 choices were presented in a different random order to each individual. There was a replication presentation of the first assortment in each k-level category to assess choice consistency (indicated in the rows of Table 1 as "Repeat"). Subjects proved to be highly consistent across the "Repeat" replications making the same decision 91.4% of the time (i.e., buy or not buy, and if buy, then the same backpack).

Finally, we established a revised reservation price for each subject as either the stated value from the direct elicitation procedure or the highest observed choice price during the simulated shopping procedure, whichever was higher. The fact that 34% of all stated reservation prices

were adjusted by an average of \$4.12, demonstrates the need for the shopping exercise in addition to the direct elicitation of reservation prices.

#### Predicting Assortment Profitability

Given that subjects made highly consistent decisions, we next explored the two alternative individual choice models for predicting the selection of each participant from each calibration assortment based on the subject's revised reservation prices. Formally, these models are:

1. The preference approach (e.g., "best item" rule: choose the most preferred item that is below the reservation price for it, and if no item is below the reservation price then don't buy)

$(\max_{i \in I} (P_i - R_i) \mid R_i \leq R) \mid (R_i > R)$

$(P_i, 0)$

Where:

$R_i$  = Reservation price for item  $i$  (epsilon)  $k$

$P_i$  = Price for item  $i$  (epsilon)  $k$

2. The value approach (e.g., "biggest deal" rule: choose the item with the largest percentage reduction from the reservation price, and if no item is below the reservation price, then don't buy)

$(\max_{i \in I} (P_i - R_i) / R_i \mid R_i \leq R) \mid (R_i > R)$

$(P_i, 0)$

Where:

$R_i$  = Reservation price for item  $i$  (epsilon)  $k$

$P_i$  = Price for item  $i$  (epsilon)  $k$

Rule 1 was the most accurate, correctly predicting the subject's choice in 82.7% of the cases whereas Rule 2 was correct in only 72.0% of all cases. Furthermore, Rule 1 predicted with 94.5% accuracy which backpack would be selected given that the subject did decide to "buy" something. Given the overall dominance of Rule 1 over Rule 2, we only present and discuss the results from Rule 1. It remains for future research to further explore the relative accuracy of these rules in different choice contexts.

We assessed Rule 1 on aggregate predictions of assortment unit sales and profitability as shown in Table 1 (see panels titled "Actual Units" and "Predicted Units"). Most importantly, the choice rule resulted in predicted assortment profitability that correlated highly ( $r = 0.96$ ) with the actual assortment profitability based on the shopping choice exercise. Figure 2 shows this relationship graphically with the assortment profits sorted by actual profit and comparing actual profit to predicted profit.

#### Developing Better Assortments

The primary objective of the calibration stage was to determine more profitable assortments based on the reservation prices and choices observed in that stage. Three strategies were used to develop profitable assortments of size  $k = 2, 3, 4$ , and 5 by the following methods:

- \* Use constant markup and select the "best sellers" for alternative retail margins of 30%, 40%, and 50%.

- \* Use a regression model and determine the "optimal" price based on own price elasticity selecting the most profitable items.

- \* Use Rule 1 as a choice simulator and employ exhaustive search to determine the profit maximizing assortment.

As it turned out, Backpack No. 8 was not selected for any of the supposedly "optimal" assortments, whereas all of the other backpacks appeared in at least one of the newly created assortments.

#### Validation Stage

The "supposedly optimal" assortments (for  $k = 2, 3, 4$  and 5) derived by the different strategies from the calibration stage (as described above) were then presented to an entirely new sample of students in the validation stage ( $n = 74$ ). The lab procedure for this stage was identical to that used in the calibration stage, except now the assortment stimuli during the simulated shopping experience were the supposedly "optimal" ones (according to the different methods). Table 2 is presented in three parts allowing a drill-down discussion of the results.

Table 2A summarizes the profits for the different supposedly "optimal" assortments developed from each method for each  $k$ -level. In virtually all  $k$ -levels the assortment and prices developed with the 30%

markup approach was more profitable than the 40% approach, which was more profitable than the 50% approach. This clearly indicates an elastic demand for the items. The regression approach, which accounts for this elasticity, selected assortments and prices that were more profitable than any of the constant markup assortments and prices. However, the experimental approach generated assortments and prices that were more profitable than all other approaches at all k-levels examined.

The next question addressed was to assess the extent to which these differences in profitability were due to the alternative methods selecting different items to include in the assortment and/or attributable to differences in prices of the same items. Table 2B shows the items included in the assortment and their prices selected as "optimal" by each method. As seen in Table 2B, the items selected for inclusion significantly differ across methods, particularly for smaller assortments ( $k=2,3$ ). Of particular interest is the difference in items selected across the three constant mark-up methods. Clearly, these pricing schemes are interacting with the assortment selection decision. For larger assortments, there was greater consistency in items selected, although significant differences remain. Comparing the "optimal" prices across methods reveals that not only are there significant differences, but many times the rank order of the prices changes across methods. For example, in  $k=3,4,5$ , the experimental approach, which generated the highest profitability, priced P6 higher than P7, whereas all the other approaches that included both these items priced P6 below P7.

Considering that both the items included and their prices vary significantly across methods underscores the importance of simultaneously selecting and pricing retail assortments. For instance, at a 30% retail margin, the best  $k=3$  assortment was determined to be items P1, P4, and P7, whereas at a 40% retail margin, the best  $k=3$  assortment was items P4, P6, and P7. Continuing with this  $k=3$  result, given that P7 is selected to be in the assortment both the regression and experimental approach suggest the price should be in the \$43 - \$44 range, a price between the 30% and 40% markups. Additionally, the experimental approach, which generated the highest profitability, suggests P7 should be the middle priced item in the  $k=3$  assortment, whereas the remaining approaches suggest it should be the highest priced item. Similar results can be found across Table 2B, which demonstrates a pattern that the "optimal" items to be included in an assortment varies across fixed pricing schemes and the "optimal" prices varies across fixed assortments.

As a final step in the validation stage, we examined the relative accuracy of the different methods in predicting the units "sold" regardless of the method used to develop the assortment. This is important because the retail buyer may need to adjust the assortment and prices attributable to factors not considered here (see limitations section for a discussion of these factors). In these situations, the retail buyer needs a robust predictive tool regardless of the assortment. Table 2C presents the predicted "sales" from the regression and experimental approaches and the actual units "sold" for all assortments and prices considered, regardless of how the assortment was determined. As shown in Table 2C, the experimental approach more accurately predicts units "sold" than the regression approach. Additionally, the experimental approach predicts the profitability of each assortment more accurately than the regression approach.

Table 3 summarizes the relative predictive accuracy of the Experimental approach compared with the Regression approach in terms of mean absolute deviation (MAD), root-mean-squared-error (RMSE) and correlation with the actual units sold ( $r$ ). Also shown is the MAD improvement percentage of the experimental approach compared with the regression approach. As can be seen, the experimental approach has lower forecast errors in units for all k-levels and provides more accurate profit predictions with the accuracy improvement, tending to increase with the k-level.

#### CONCLUSION, IMPLICATIONS, AND FUTURE RESEARCH

Our methodology and research is meant to be an exploratory assessment

and possible solution to a common retail assortment approach used by some apparel buyers in what they call "market tests." The approach focuses on one way to include shopper input to the assortment and pricing decision in a meaningful way and follows in the growing tradition of physical and computer-simulated laboratory experiments (Burke, Harlam, Kahn, and Lodish 1992).

The approach might be implemented with shoppers recruited from a store who would participate in a nearby lab setting. Many malls now house marketing research facilities for focus groups and other research purposes that would be adequate to accommodate the type of research suggested herein. Store intercept recruiting would target current store customers and mall intercepts would target the broader group of prospects who are not shoppers but are in the intended segments for the store. After the assortment research data is collected, participants could be further questioned to address segmentation and use-occasion data needs. In an actual implementation of this approach there would need to be careful attention given to these sampling issues. Although clearly a labor-intensive approach, one must determine if the benefits would be worth the costs involved. For small or single-store retailers, the approach may be too expensive, but for large retail chains with hundreds of stores, the research costs may be trivial relative to the systemwide benefits from better planograms.

Another key issue would be the possibility of a self-serving bias from shoppers who might hope to induce the retailer toward lower prices by their answers and simulated choices (which is less of a problem with students in a university lab). A good cover story would be needed to alleviate this problem.

A possible benefit of the approach is that the basic model of choice could be implemented via a decision support system to allow the buyer "what if analysis" about pricing and assortment alternatives. For fast turnaround, the procedure might be implemented at a number of locations via a Web-based approach for the simulated shopping with near instantaneous analysis and results.

There are a number of implications and directions for future research. The current research has addressed only one product category: backpacks. It would seem that the approach is probably most applicable to high involvement, decision-making categories and shopping goods as opposed to frequently purchased, low-involvement, or impulse items. However, this is an issue appropriate to future **research**. The choice rules used to model **consumer** decisions would need to be explored carefully because although Rule 1 proved best in our analysis, Rule 2 might be better for other product categories. Also a weighted model based on the two rules or even completely new rules might lead to improvements and/or be required for different categories.

Also, our research has been validated only in a lab-setting and future research should extend validation into an actual store setting. In-store conditions may so distort consumer decisions to invalidate our results. For instance, it may be that higher inventory levels, if kept out in display areas, could positively influence sales that would be an influence different from our lab-based validation sample (Urban 1998). We feel that such an effect would be more expected with impulse and low-involvement goods than shopping goods. This is because with shopping goods:

- \* Shoppers are willing to switch stores
- \* Shelf facings and inventory levels may be less influential than for lower involvement, impulse, or frequently purchased and low-priced items
- \* Consumer introspection is better (favoring the type of direct questioning done herein)

However, more research is needed to assess these observations.

In addition, the generalizability of the findings should be couched in the perspective that the research paradigm is static in nature and does not address the many dynamic aspects of markets. (8) Such dynamics including: (a) competitors who may react to the chosen assortment selection and pricing, and (b) seasonal effects that may alter what is the best

selection and pricing over time. These dynamics point to important areas for future research.

With so many possible avenues for future research, a useful approach might be an assessment of retail buyer's current approaches to gain insights into the relative importance of each issue. This may help prioritize the avenues for future investigation as well as to document more extensively what practices are currently in use.

Our focus has been on the joint decisions of item selection and pricing. Most of the literature to date has focused instead on the joint decisions of selection and space allocation. A difficult but needed extension is to bring all three aspects of the assortment problem together including the joint decisions of selection, pricing, and space allocation. Possibly virtual-reality shopping simulations could be used in an experimental design to tackle this three-dimensional optimization problem.

For instance, a key area for future research is to determine how space should be allocated to the category in light of the number of items carried. The retailer could continue to devote the same space to the category regardless of how many items are carried, or might reduce the space when deciding to carry fewer items. Such decisions involve intercategory effects that are beyond the scope of the current study.

In addition, there are a host of more strategic issues that this study does not attempt to address such as the longer run effects of the assortment on store image and store choice. After all, store image and store choice are, in large part, a function of how many items and which ones are carried to say nothing of how they are priced. Clearly, the complexity of the assortment problem is worthy of this special issue of the journal.

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#### NOTES

(1.) Total contribution margin seems the most appropriate goal for the pre-season assortment selection and pricing decision that we deal with here. However, as noted by an anonymous referee, during the purchasing process investment and risk considerations come into play influencing how much to purchase. In those considerations, more complex financial measures such as Gross Margin Return on Investment (GMROI) and Direct Product Profitability (DPP) become more relevant financial measures.

(2.) We interviewed a convenience sample of buyers at five women's specialty chains representing over one thousand stores as well as two category management specialists at a national brand management oriented manufacturer selling a wide variety of consumer products through supermarkets.

(3.) The first author was engaged in developing a retail testing system for a group of women's apparel retail companies and the "best sellers" procedure was used by the buyers at those national chains. In addition, those buyers reported that they had used these procedures at previous jobs when they worked at other retail firms. The buyers did use a certain amount of personal judgment about substitutability, but the "best sellers" approach was the basic procedure for testing and selection.

(4.) A much more elaborate econometric approach could be devised to estimate own- and cross-price elasticities, but the data needed would be untenable in cost and complexity. Our goal is to investigate practical, low cost approaches.

(5.) In the case of eight items, there would be  $((C_{sup.8})_{sub.1}) + ((C_{sup.8})_{sub.2}) + ((C_{sup.8})_{sub.3}) + ((C_{sup.8})_{sub.4}) + ((C_{sup.8})_{sub.5}) + ((C_{sup.8})_{sub.6}) + ((C_{sup.8})_{sub.7}) + ((C_{sup.8})_{sub.8}) = 256$  possible assortment combinations. Then if there were five possible prices contemplated for each item the joint combinations explode astronomically.

(6.) For an alternative approach that uses conjoint analysis and real products for retail assortment selection and pricing see Green and Savitz (1994). In that research, item prices and availability were presented in a



fractional factorial design for the purposes of estimating conjoint-based utilities for each assortment possibility from the partworths of product availability and prices, respectively.

(7.) When retailers are doing product development, which some do, many other approaches and methods need to be assessed.

(8.) Note that this caveat about market dynamics would apply as well to many other published articles about assortment planning.

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		Actual vs. Predicted Sales								Actual Units
Test Assortments		P1	P2	P3	P4	P5	P6	P7	P8	(q.sup.1)
k = 8 Items	\$40	\$26	\$40	\$40	\$36	\$39	\$43	\$36		23
Repeat	\$40	\$26	\$40	\$40	\$36	\$39	\$43	\$36		24
k = 2 Items	\$41		\$41							58
Repeat	\$41		\$41							58
		\$41	\$43							
	\$31				\$31					81
	\$37	\$29								64
	\$35					\$43				67
k = 3 Items	\$37	\$29					\$35			25
Repeat	\$37	\$29					\$35			19
	\$45					\$39	\$41			10
			\$49	\$29	\$33					
			\$49		\$45	\$43				
	\$29				\$41	\$33				40
k = 4 Items	\$43	\$29			\$49		\$43			16
Repeat	\$43	\$29			\$49		\$43			18
	\$41	\$45		\$45				\$25		58
		\$33		\$35	\$37			\$33		
		\$31	\$31		\$43		\$37			
	\$33	\$45				\$27	\$45			53
k = 5 Items		\$37	\$27	\$49	\$45	\$43				
Repeat		\$37	\$27	\$49	\$45	\$43				
		\$33			\$45	\$43	\$27	\$39		
		\$41	\$45	\$27	\$27			\$41		
	\$33		\$43		\$41	\$33		\$47	62	
	\$49			\$49	\$47	\$41	\$31			2
k = 6 Items	\$25	\$39	\$33		\$41		\$37	\$27	65	
Repeat	\$25	\$39	\$33		\$41		\$37	\$27	65	
	\$37	\$35	\$39		\$43	\$43		\$25	62	
		\$45	\$49	\$45	\$35	\$37	\$41			
		\$37	\$45		\$25	\$41	\$43	\$35		
	\$39	\$41	\$33	\$29		\$29		\$33	25	
(q.sup.2)		(q.sup.3)	(q.sup.4)	(q.sup.5)	(q.sup.6)	(q.sup.7)				
k = 8 Items	3	4	10		0		13		45	
Repeat	2	2	6		0		11		39	
k = 2 Items		7								
Repeat		9								
	1	31								
	3				2					
								10		
k = 3 Items	1									69
Repeat	1									74
										56
			13		1			13		
		2						7		61
					0					58
k = 4 Items	1				0					54
Repeat	3				0					53
	0		5							
	1		41		0					
	1	14			0					72
	0							29		15
k = 5 Items	1	41	6		0			18		
Repeat	0	41	7		0			13		

	1			0	3	98
	2	6	46	3		
		3		0	23	
			3	0	6	87
k = 6 Items	0	8		0		24
Repeat	0	4		0		29
	0	6		0	10	
	1	1	3	1	19	56
	2	1		2	12	52
	0	6	25		33	
Predicted Units						

	(q.sup.8)	Profit	(q.sup.1)	(q.sup.2)	(q.sup.3)	(q.sup.4)
k = 8 Items	0	\$1,400	19	3	9	15
Repeat	0	\$1,203	19	3	9	15
k = 2 Items		\$975	51		24	
Repeat		\$1,005	51		24	
		\$551		2	32	
		\$420	90			
		\$740	79	2		
		\$780	70			
k = 3 Items		\$774	22	1		
Repeat		\$743	22	1		
		\$1,098	11			
		\$588				18
		\$1,102			2	
		\$413	35			
k = 4 Items		\$1,097	22	2		
Repeat		\$1,140	22	2		
	0	\$965	54	0		18
	0	\$385		2		45
		\$736		1	24	
		\$675	50	0		
k = 5 Items		\$517		2	42	16
Repeat		\$431		2	42	16
	0	(\$24)		1		
	0	\$219		1	7	55
	0	\$661	55		18	
		\$474	2			15
k = 6 Items	1	\$212	38	0	14	
Repeat	0	\$225	38	0	14	
	1	\$938	51	1	22	
		\$1,072		1	0	17
	0	\$1,033		1	3	
	0	\$562	29	0	12	25
	(q.sup.5)	(q.sup.6)	(q.sup.7)	(q.sup.8)	Profit	
k = 8 Items	0	18	31	0	\$1,342	
Repeat	0	18	31	0	\$1,342	
k = 2 Items					\$1,125	
Repeat					\$1,125	
					\$592	
	1				\$458	
		18			\$893	
			75		\$948	
k = 3 Items			75		\$783	
Repeat			75		\$783	
		19	55		\$1,186	
	1	39			\$718	
		9	65		\$1,201	
	0		66		\$438	
k = 4 Items	0		58		\$1,271	
Repeat	0		58		\$1,271	
				1	\$1,154	
	0			0	\$437	

	0		65		\$722
		28	26		\$840
k = 5 Items	0	16			\$733
Repeat	0	16			\$733
	0	10	93	0	\$104
	3			0	\$223
	0	24		0	\$875
	0	12	72		\$798
k = 6 Items	0		52	0	\$531
Repeat	0		52	0	\$531
	0	14		1	\$1,114
	0	24	46		\$1,231
	3	20	55	0	\$1,223
		30		0	\$646

Note 1: Read as follows: Consider Row 3 of this table, which is an assortment of two products. Product 1 is priced at \$41 and Product 3 is also priced at \$41. The actual units "purchased" in the shopping exercise were 58 units of Product 1 and 7 of Product 3. Based on the reservation price and the use of the choice rule discussed in the text (Rule 1), the predicted units are 51 of Product 1 and 24 of Product 3.

#### Profits by Method

Assortment Method		#Items	30%	40%	50%	Regr	Expr
Assortment Size	k = 2		\$643	\$403	\$252	\$683	\$736
	k = 3		\$662	\$590	\$299	\$725	\$735
	k = 4		\$730	\$773	\$455	\$749	\$809
	k = 5		\$691	\$674	\$403	\$744	\$822

#### Sales and Profits

"Optimal" Assortments									
k	Method	P1	P2	P3	P4	P5	P6	P7	
k = 2	30% Margin				\$37			\$40	
	40% Margin				\$43		\$42		
	50% Margin			\$34				\$56	
	Regression	\$40						\$44	
	Experimental	\$41						\$43	
k = 3	30% Margin	\$37			\$37			\$40	
	40% Margin				\$43		\$42	\$47	
	50% Margin			\$34			\$51	\$56	
	Regression	\$40			\$38			\$44	
	Experimental	\$41					\$45	\$43	
k = 4	30% Margin	\$37			\$37		\$36	\$40	
	40% Margin	\$43			\$43		\$42	\$47	
	50% Margin	\$52		\$34			\$51	\$56	
	Regression	\$40			\$38		\$37	\$44	
	Experimental	\$41			\$43		\$45	\$43	
k = 5	30% Margin	\$37		\$24	\$37		\$36	\$40	
	40% Margin	\$43		\$28	\$43		\$42	\$47	
	50% Margin	\$52		\$34	\$52		\$51	\$56	
	Regression	\$40			\$36	\$38	\$37	\$44	
	Experimental	\$41			\$43	\$31	\$45	\$43	

Note: Backpack #8 omitted because it did not appear in any of the "optimal" assortments.

#### Predicted vs. Actual Units

##### Predicted Units ("Best" Rule)

k	Method	(q.sup.1)	(q.sup.2)	(q.sup.3)	(q.sup.4)	(q.sup.5)
k = 2	30% Margin				13	
	40% Margin				13	
	50% Margin		3			
	Regression	32				
	Experimental	20				
k = 3	30% Margin	18			13	
	40% Margin				12	

	50% Margin		3		
	Regression	25			13
	Experimental	20			
k = 4	30% Margin	16			12
	40% Margin	11			11
	50% Margin	1	3		
	Regression	20			13
	Experimental	19		9	
k = 5	30% Margin	15	2		12
	40% Margin	11	3		11
	50% Margin	1	3	0	
	Regression	17		9	11
	Experimental	19		9	

2

Predicted Units  
(Regression)

k	(q.sup.6)	(q.sup.7)	Profit	(q.sup.1)	(q.sup.2)	(q.sup.3)
k = 2		41	\$637			
	15		\$471			
		4	\$164		1	
		21	\$785	25		
		40	\$902	23		
k = 3		33	\$739	30		
	13	7	\$554			
	3	3	\$212		1	
		17	\$779	25		
	6	36	\$960	23		
k = 4	15	26	\$781	30		
	13	6	\$705	20		
	3	3	\$238	4	1	
	15	15	\$852	25		
	6	28	\$977	23		5
k = 5	15	26	\$784	30	2	
	13	6	\$738	20	2	
	3	3	\$238	4	1	0
	14	13	\$832	25		10
	6	28	\$993	23		5

Actual Units

k	(q.sup.4)	(q.sup.5)	(q.sup.6)	(q.sup.7)	Profit	(q.sup.1)	(q.sup.2)
k = 2	15			36	\$599		
	9		8		\$286		
				5	\$157		0
				28	\$799	27	
				30	\$797	21	
k = 3	15			36	\$929	21	
	9		8	22	\$705		
			0	5	\$157		0
	14			28	\$967	26	
			5	30	\$895	19	
k = 4	15		14	36	\$1,078	18	
	9		8	22	\$1,045	16	
			0	5	\$261	5	0
	14		13	28	\$1,119	17	
			5	30	\$980	17	
k = 5	15		14	36	\$1,092	16	1
	9		8	22	\$1,068	18	1
			0	5	\$261	4	0
	14		13	28	\$1,219	17	
		1	5	30	\$987	19	
k	(q.sup.3)	(q.sup.4)	(q.sup.5)	(q.sup.6)	(q.sup.7)	Profit	
k = 2		7			47	\$643	
		9		15		\$403	
					9	\$252	
					19	\$683	

			28	\$736
k = 3	3		33	\$662
	5	12	16	\$590
		4	7	\$299
	6		18	\$725
		3	26	\$735
k = 4	3	14	29	\$730
	2	12	14	\$773
		5	7	\$455
	7	16	15	\$749
2		5	28	\$809
k = 5	4	13	27	\$691
	0	10	10	\$674
	0	4	7	\$403
7	5	13	14	\$744
1		5	26	\$822

Note: Backpack #8 omitted because it did not appear in any of the "optimal" assortments.

		Units				Predictive Accuracy Profits			
		MAD	RMSE	r	% Better	MAD	RMSE	r	% Better
All	Expr	3.57	4.71	0.885		105	120	0.951	
	Regr	4.90	6.31	0.867	27%	215	247	0.924	51%
k = 2	Expr	4.40	5.44	0.922		86	100	0.975	
	Regr	4.60	5.87	0.890	4%	87	91	0.980	0%
k = 3	Expr	4.07	5.34	0.868		96	117	0.966	
	Regr	4.93	5.91	0.908	18%	185	194	0.925	48%
k = 4	Expr	3.55	4.53	0.833		114	135	0.970	
	Regr	5.25	6.53	0.869	32%	271	283	0.943	58%
k = 5	Expr	2.96	4.10	0.857		116	124	0.998	
	Regr	4.72	6.52	0.880	37%	315	343	0.882	63%

1. MAD = Mean Absolute Deviation (predicted vs. actual)

2. RMSE = Root Mean Squared Error (predicted vs. actual)

3. r = correlation (predicted vs. actual)

5. MAD % Better = % improvement by experimental approach compared to regression approach.

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INDUSTRY CODES/NAMES: BUSN Any type of business; RETL Retailing  
 DESCRIPTORS: Retail industry--Marketing  
 GEOGRAPHIC CODES/NAMES: 1USA United States  
 PRODUCT/INDUSTRY NAMES: 5200000 (Retail Trade)  
 EVENT CODES/NAMES: 240 Marketing procedures  
 FILE SEGMENT: TI File 148

... frequently purchased, low-involvement, or impulse items. However, this is an issue appropriate to future **research**. The choice rules used to model **consumer** decisions would need to be explored carefully because although Rule 1 proved best in our...176.

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